



# COLORADO SCHOOL OF MINES

EARTH • ENERGY • ENVIRONMENT

## PETROLEUM ENGINEERING

NEWSLETTER

VOL. 18, NO. 1 NOVEMBER 2014

## GREETINGS FROM DR. ERDAL OZKAN



**Dr. Erdal Ozkan**  
Professor and Interim Department Head

Greetings,

The CSM PE Department has always had an impeccable standing in petroleum engineering education, and preserving this stature has been a traditional challenge for us. In the last decade, we have also complemented our leadership challenge in education with the mission of creating a substantial research portfolio. To give you a sense of magnitude, our current challenge is to provide

the best education to 739 undergraduates and 116 graduates and manage an impressive research portfolio of over \$5 million annually with a modest faculty of 13 full time members. For us, however, challenges are not hurdles, but opportunities to improve. In this newsletter, you will read the news from our faculty, staff, and students, and feel the excitement across the board unhampered by any challenge. Before you start turning the pages to enjoy reading about the accomplishments of your alma mater, a brief status report is in order:

On the educational front, large enrollment numbers continue to be a concern to meet the quality standards, not only for us, but also for all PE programs, nationally and internationally. Having recently moved into an impressive, new building, Marquez Hall, we are more fortunate than most other PE programs to provide modern educational facilities to our students. However, the sheer number of students in classrooms, hiking up to 200 now, inevitably overwhelms the capacity of any facility and the faculty feels the pressure to introduce innovative teaching

techniques to replace the advantages of personal touch with the students. In addition, the new developments and trends in petroleum engineering brought forth by the unconventional reservoir revolution have necessitated untraditional concepts to be incorporated into our curriculum. We will be vigorously reviewing and constantly revising our undergraduate and graduate programs to meet the challenges imposed on us.



**Erdal with TA's, Wisam, Hulya and Lia in Houston visiting Pioneer for the 315 Field Session**

As for the research, with the confidence of our proven success in the last decade, we now challenge ourselves with the mission of creating a research program, which does not simply follow the main stream PE research, but also sets up the standards and leads to new frontiers. Our research programs, such as fluid flow and phase behavior in nano-porous media, petrophysics and

**PE STATISTICS FOR 13-14**  
New Research  
Contracts \$5,862,839

### GRADUATES

PhD	5
MS/ME	36
BS	131
Placement as of May (%)	94%

### CURRENT ENROLLMENT

PhD	46
MS/ME	52
Seniors	190
Juniors	230

\*Sophomore/Freshmen - do not declare until Spring Semester

## DR. OKZAN CONT.

geomechanics of unconventional reservoirs, EOR applications in tight unconventional reservoirs, CO<sub>2</sub> sequestration, and innovations in drilling and completions, have already received respect from the engineering and scientific communities. We are up to the challenge of becoming a research powerhouse serving, not only today but also the future of the petroleum engineering and science.

I am proud to report that Teaching Associate Professor Dr. Carrie McClelland has received the SPE Innovative Teaching Award for her dedication to the profession of engineering education. I also want to congratulate Teach Associate Professor, Dr. Linda Battalora for receiving the SPE Technical Award for Health, Safety, Security, Environment and Social Responsibility. Furthermore, Dr. Jennifer Miskimins, an alumnus and part-time member of our faculty, will be recognized as the recipient of the SPE Completions Optimization and Technology Award at the SPE ATCE in Amsterdam this year.

Finally, before concluding, I would like to thank Dr. William Fleckenstein for serving as the Interim Department Head for the past two years. Because of his efforts, we have seamlessly fulfilled our commitment to excellence in teaching and research and actively pursued several important outreach opportunities. My primary task will be to lead the search process to fill the "Mick" Merelli/Cimarex Energy Distinguished Department Head Chair position. We will also be conducting another

search to fill two newly established faculty positions. To identify highly qualified candidates, we will need the help of our alumni, friends, and industry supporters.

Thanks for your continuing support and please stay in touch.



Erdal on Inaca Island, Mozambique, in late August, smiling not knowing that he would be asked to step up to take the interim department head responsibility in less than a week

## PETROLEUM ENGINEERING

### RAMONA M. GRAVES - DEAN OF CERSE



Grandma and Oliver

Fall of 2014 is the beginning of my third year as Dean of the College of Earth Resource Sciences and Engineering (CERSE). A little refresher – CERSE consists of the departments of Mining Engineering, Geology and Geological Engineering, Petroleum Engineering, Geophysics, Economics and Business and Liberal Arts and International Studies. Also included in the CERSE team is the Colorado Geological Survey (CGS). CGS has now successfully been transferred to Mines and we have recently hired a new State Geologist. A few statistics about CERSE: 27% of Mines undergraduate students (34% increase), 45% of Mines graduate students (20% increase), 34% of Mines faculty (8% increase), and **37% of 2014 Mines research awards (75% increase)**. All of these statistics confirm that the traditional departments at CSM which built our reputation are stronger than ever! How fortunate I am to have led one amazing department, PE, and now have another amazing group of academics to lead! Some days I miss the daily interaction with the PE faculty and students but since my office suite is in Marquez Hall, I still see everyone pretty regularly. However with all the great accomplishments of PE, CERSE, and Mines, the accomplishment that I am most thrilled about (and take complete credit for!) is my grandson Oliver (he is really Lacey's greatest accomplishment!). I think he looks like me or maybe it is just the red hair! Stop by any time and we'll catch up.

## BILL SCOGGINS - RESEARCH PROFESSOR & CSM PRESIDENT



Dr. Bill Scoggins

It's an exciting time to work in the energy industry, especially petroleum engineering. The outlook for domestic oil and gas has dramatically changed from one of declining production to abundance at break-neck speed, and this reality has demanded that industry, government, and academia respond just as quickly. I was recently invited to give a public technical lecture at my alma mater, the University of Tulsa, and I've been thinking about unconventional oil and gas production in terms of a "Black Swan" phenomenon.

Author and statistician Nassim Nicholas Taleb developed the "Black Swan" theory to explain rare and unpredictable events which have reality-altering impact, such as spotting a black swan when evidence up to that point indicates that all swans are white. Taleb asserts that "history does not crawl; it jumps." We've experienced the "jump" in the last few years and we are on the frontier of a new generation of oil and gas production, and in the Denver area, we see the hot button issues of urban encroachment and environmental impact play out daily in the local news.

This domestic oil and gas boom is a game changer on so many levels— from drilling-related water usage and disposal to the geopolitical sphere. And in that regard, Mines is an intellectual powerhouse, with Petroleum Engineering faculty and students working with counterparts from all over campus such as Civil & Environmental Engineering to the Master of International Political Economy of Resources program to better understand and contribute to the complex world of global earth resource study and research.

This rapid growth has also led to increased collaboration between academia, government, and industry— leading to improved student outcomes, greater applied research opportunities for students, and an overall increase in faculty and infrastructure support. Additionally, academia has an important role to play in public outreach and education so that there is a better understanding of drilling and production technology, the resource opportunity, and community and environmental impacts. It's a truly remarkable time to be a Mines student: to work with world-class faculty to learn and add to the body of knowledge of global resource and energy challenges, and to participate in one of the defining discussions of the early 21st century. Make the most of this opportunity and make 2014 a great year!

Best regards,

Bill Scoggins





## HAZIM ABASS



My Family

We meet again, Colorado School of Mines. Throughout my career years, I would have never imagined to be back at the very university that helped me and my family in making my dreams reality. This time I am not a newlywed student walking through the doors with unanswered questions. I now join the university as a grandfather, professor, and FAST research director at the Petroleum Engineering Department.

Starting from Iraq and forming a circle around the globe to return once again to CSM, I could not be more thrilled to share with my students the knowledge and experiences I have gained throughout the main stations of my career's endeavors. Starting from Babylon Iraq, The Cradle of Civilization where I was born, I received my BS in PE from the University of Baghdad. My father advised me to never stop seeking higher education and to engrave his point he said "I would even sell my jacket for you to get a Ph.D." This pearl of wisdom became the source of my thirst for knowledge that eventually persuaded me to pursue my graduate program here at Mines. With the help of my advisor, Dr. D.M. Bass, I earned my Ph.D., and with the help of Dr. Craig Van Kirk, I obtained legal papers to work and eventually became a citizen of the USA.

After achieving the goal of the honor mission at CSM, my wife, my little girl Rhea and I landed in Duncan, Oklahoma to

work, for 8 years, at the Halliburton Research Center applying the knowledge I acquired at CSM. A new opportunity took my family, now with another daughter, Sarah, to Caracas, Venezuela where I was assigned at the Research Center of PDVSA in Los Teques. Expanding upon my school education and professional experience, I was blessed to absorb a new language and international views on all aspects; technical, social, and philosophical.

After 5 years, a new career adventure came my way. My family and I moved to Saudi Arabia where I eventually became a senior consultant and the unconventional- resources Focus Area Champion at the Advanced Research Center (ARC) of Saudi Aramco. I will be forever grateful to the intangible wisdom absorbed from my time with Saudi Aramco. The ARC was the nest to lay research ideas to grow and be ready to fly for field implementations.

Now I have closed yet another chapter in my life and I am ready to begin another. I am eager to pass on all the knowledge, I have accumulated over the years, with the students and to enjoy watching them succeed. I owe my mentors carrying their message in transmitting knowledge and wisdom- I am ready to give back to the university I graduated from.



A CSM student with daughter and later with her daughter

## LINDA ANN BATTALORA



Dr. Linda Ann Battalora

Time flies! We started our third academic year in our beautiful building, Marquez Hall. This semester I am teaching PEGN681 Petroleum Seminar and two sections of PEGN310 Petroleum Reservoir Fluids along with Dr. Xiaolong Yin. Last spring Dr. Mark Miller, our colleagues from the Geological and Geophysical Engineering Departments and I taught the PEGN439 Multidisciplinary Engineering capstone course with a focus on unconventional reservoirs. Additionally, I taught Environmental Law for both the Petroleum Engineering Department and the Civil & Environmental Engineering Department (CEE) and was the Department Coordinator for our four PEGN315 Field Sessions. In May, I graduated with my Ph.D. in Environmental Science and Engineering, and led a group of 56 students to Southern California and Bakersfield on the annual California PEGN315 Field Session. Most of my summer was spent writing manuscripts for submission to peer-reviewed journals along with hiking and camping.

I continue to serve in a variety of capacities with the Society of Petroleum Engineers International (SPE): Faculty Advisor to the CSM SPE Student Chapter, Board Member of the SPE Denver Section, member of the Health, Safety, Security, Environment and Social Responsibility (HSSE-SR) Advisory Board, SPE Sustainability Task Force, 2015 HSSE-SR Americas Conference Health

### BATTALORA CONTINUED

and Safety Subcommittee and the 2015 ATCE Health, Safety and Environment (HSE) Subcommittee. I received a Faculty Enhancement Travel Grant to attend the 2014 SPE International HSSE-SR Conference in Long Beach, CA. I was awarded the 2014 SPE North America Rocky Mountain Region Health, Safety, Security, Environment and Social Responsibility Award for service in the technical category of HSSE-SR.

Our SPE Student Chapter had another great year. We received over \$50,000 in undergraduate scholarships from SPE Denver Section as well as financial support for our Petro Bowl Team to attend the 2014 ATCE in Amsterdam. The student chapter organized their annual major fundraisers, a golf tournament and a clay shoot. Both of these activities had great industry turnout and they are slated again this year.

The annual Joint Session Meeting with the SPE Denver Section was a tremendous success. For the third year, the event was held at CSM in Freidhoff Hall. We were pleased with the tremendous turn out from the SPE Denver Section and industry and are grateful for their financial support. We are also very proud of our SPE Student Chapter Officers for their tremendous leadership, professionalism and organizational skills that made this event so successful.

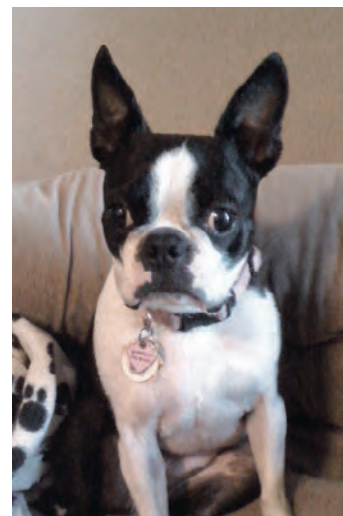
I continue to work closely with the Association of International Petroleum Negotiators (AIPN). One of my favorite "duties" as a member of the Education Committee is to judge the annual Writing Competition that is open to all universities that have an affiliation with AIPN. I enjoy the opportunity to read and rate the papers and to work with other members of the Education Committee to select winners to attend the Annual Conference. Additionally, I advised a graduate student from the Economics

and Business Department who was awarded \$5000 to perform Summer Research.

Outside of CSM, I maintain my legal consulting practice in environmental and international oil and gas law. It is a pleasure to work with my colleagues Laure Bonna, Philippe Auzas, and Audrey Grosset at Bonna Auzas Avocats of Paris, France and to occasionally have them co-teach with me a short course on international hydrocarbon agreements. On a personal note, I continue to take ballet and pointe classes, yoga, lap swim, hike and occasionally attend a book club meeting.

"Rosebud," my brilliant Boston Terrier, will be six years old in December. Where does the time go? She continues her education a few days a week at Animal Lodge, the doggie daycare of Alameda East Veterinary Hospital, where she has many friends. A socialite, she loves all people and other animals!

Thanks for your continuing support of the Petroleum Engineering Department and Mines! We look forward to seeing many of you at ATCE 2014 in Amsterdam and of course, we always enjoy seeing you on campus for alumni events and recruiting!



Rosebud

### TOM BRATTON - SCHLUMBERGER VISITING SCHOLAR



Tom Bratton

Another year has come and gone and what a year it was. Dr. Prasad and I taught petrophysics to over 200 students. I don't know if this was a record number of students, but we never could have done it without the help of our fourteen teaching assistants who were among the top students from the previous class. I've heard it said that you develop a deeper insight and understanding while teaching. I know I certainly believe it and I'm sure Dr.

Prasad does as well. I think that is why she organized a two

week "Boot Camp" for this year's crop of top students and this year's new teaching assistants. The first week was held over spring break. Eighteen students gave up Daytona Beach for a review of the previous course material graciously taught by Don Westacott, the Global Unconventional Reservoirs Advisor for Halliburton. Don again returned in June for the second week consisting of field visits to Halliburton and Weatherford and a short but advanced petrophysical project. The dedication of last year's teaching assistants and this new batch of teaching assistants is remarkable. Thanks to all of you for all your help. It's exciting to look toward the future and see the advancements in technology. What took weeks to compute with pencil, paper, and a slide rule in the 1970s now takes microseconds with today's computers and specialized software. This resource is vital to the solution of the typical problems facing the industry today. Special thanks go to Schlumberger who donates their state-of-the-art software on a yearly basis to CSM for teaching and research. Schlumberger's Techlog is a good example. It is



### BRATTON CONTINUED

currently being used in the teaching of petrophysics at CSM. This is the same software used globally by Shell, bp, and many other operating companies. It is also used globally by Schlumberger, Baker Atlas and Weatherford. Thus, CSM students and faculty have the same tool as the industry at large to solve the complex petrophysical problems facing the industry today.



Hiking in the Mt. Evans area

On a personal note, I look at these tools we have today and the formidable problems we have yet to solve, and I wish I was 23 years old all over again. With the current software and the knowledge gain over the last 4 decades, what will we be able to come up with tomorrow? I left academia after earning a MS degree in Physics in 1977. I'm now continuing my education at CSM working for a doctorate in Geophysics. This is going to be fun!



Fly-Fishing on the Big Horn in Montana

Off campus, I'm involved with the Colorado Mountain Club. I continue to participate in group hikes to see the wonderful mountains Colorado has to offer. I also volunteer to help teach Colorado Mountain Club's Wilderness Trekking School. This class extends over several weeks and teaches students how to climb our tallest mountains. We cover simple things like how to return hydrated. We also cover more advanced topics such as navigation using map and compass, survival skills and traveling safely over snow. I very much enjoy meeting new people and hiking and fly-fishing in our wildernesses.



Fly-fishing for Coho in Alaska

### ALFRED W. EUSTES



Susan and I at Brooks Falls, Alaska

This has been the year of the sabbatical. This academic year, I spent it working on research activities, running two faculty search committees, and traveling on an SPE Distinguished Lecturer tour. I will start with the latter, first.

I started the tour in sunny Alaska in September. I went a week earlier with Susan to enjoy the wilds. Visiting Alaska in September is the time to go. The leaves are turning a gorgeous autumn hue, the tourists are sparse, and there was no snow. Plus, the various tourist rates were lower than in summer! Susan and I landed in Anchorage and drove up to the University of Alaska, Fairbanks, my Mother's alma mater and where I graduated from high school. I first gave my talk, "Extraterrestrial Drilling: How on Earth can Martian Drilling Help Us?" to the students and faculty there. We returned to Anchorage to give the same talk to the SPE and AADE sections there in a joint session in a movie theater (which was a first for me). Then, Susan wanted to see bears so we went to Homer,

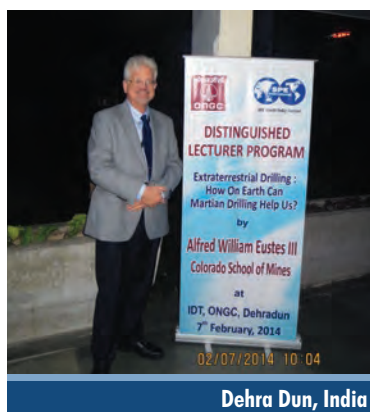
## EUSTES CONTINUED

rented a seaplane, and flew to Katmai National Park and Brooks Falls. Did we see bears? Oh yes, up close and too personal. They were everywhere. Big brown ones, little brown ones, and upset mother bears. I took a lot of photos and videos, one of which is shown here.



**Bear Up Close and Personal**

The next week, I went to Grand Junction where my talk was competing with the Broncos versus the Raiders (I didn't stand a chance) and on to Rock Springs. A couple of weeks later, I visited New Orleans in October (a few weeks after the ATCE), and in November to Duncan, Fort Worth, and Austin. I was also selected as a Baker Hughes Distinguished Lecturer for November. They simulcasted my talk live from the Houston Rankin Road facility out to all of their interested labs world-side. I was the keynote speaker at the SAGEEP conference in Boston in March. I also had a great visit and talk in Bakersfield in April. Those all went well. And what was really cool was meeting our alumni in those locations and finding out how successful they have all become!



**Dehra Dun, India**

In February, I had my first international tour. The SPE really takes care of their DL's. They do an outstanding job organizing and executing the tours. Other than an unscheduled snow storm in Denver canceling the initial flight, it went smoothly. From Denver to Newark to New Delhi, India for an overnight in the most expensive place I have ever stayed! (\$700!) Then on Dehra Dun, India

where I was treated like a "rock star". And there were wild monkeys along the side of the road from the airport! Then on to Manila, Philippines via Singapore (20 minute layover) for a day for a nice stopover and hospitality from the Manila section. Then I traveled the next morning on to Kuala Lumpur, Malaysia, a very nice place where I gave my talk to a receptive audience. The next day, I traveled from Kuala Lumpur to Kuantan on Malaysia's Pacific coast and a 110 km drive to Terengganu at Peramina's offices. They drove me back to Kuantan where I flew to KLIA then on to Jakarta, Indonesia. I spent 19 hours in Indonesia, giving my talk to a great group and then headed to Tokyo, Japan. After a 12 hour layover, I headed home on the Tokyo to Denver United flight. So I left Denver going east and did not stop going east until I returned to Denver all in ten days. Take that Jules Verne.

The next international trip was to Europe. I was supposed to visit Samara, Russia; but, I reluctantly declined giving the state of conditions between the US and Russia. It was just as well. I started in Krakow, Poland giving the talk to an enthusiastic group primarily made up of students. They have a pretty strong SPE section there. Then, I flew on to the Aegean coast to Kavalla, Greece. I spent an extra day enjoying Grecian hospitality and then my talk. This was during the EU elections which made it interesting to watch. Curiously, joining me there on the same flight in was Dr. Tom Blasingame of Texas A&M. We had a nice time together at the University. Then it was on to Milan, Italy to ENI's headquarters where I was once again simulcasted world-wide. Early the next morning, it was on to Aberdeen, Scotland where I felt like I was in a Harry Potter movie set, and the next day to Great Yarmouth in England for my last talk. If you want to see my talk in Aberdeen, go to <http://www.energyvoice.com/2014/06/video-pathway-north-sea-mars-two-way-street/>. I hope the site will still be there when you read this. I will be giving this talk to the DFW AADE on September 17th in Fort Worth. If you get this before then, come on by!



**Krakow, Poland**

I get a lot of questions after my talk. Perhaps the most interesting one was in Anchorage. I was asked about the two drill holes on Mars constructed by the Curiosity mission. They wanted to know the cost per foot. To tell the truth, I don't think the cost per foot was all that much. It was the mobilization cost that was astronomical!

The research activities have been coming fast and furious. I have been working with the Unconventional Natural Gas and Oil Institute (UNGI) with Montanuniversität Leoben on rig real time data analysis and reservoir characterization. I also have been working with the Vaca Muerta Consortium for Argentina. I also have been working with Will Fleckenstein on the CU Boulder's NSF grant on Sustainable Research Network on Routes to Sustainability: Natural Gas Development and Air and Water Resources in the Rocky Mountain Region. In an exciting development, CSM and the National Renewable Energy Laboratory (NREL) have created the Colorado SURGE (Subsurface Research in Geothermal Energy). As part of that, a team of students and I are working on two geothermal drilling projects, one on oil and gas / geothermal drilling technology transfers and a second on horizontal, stimulated enhanced geothermal system. Finally, I am the industrial liaison for the NSF's Ice Coring Program Office for all science related ice coring and drilling. All in all, it is a really busy time with activity.



### EUSTES CONTINUED

I also chaired two faculty searches. One was for a FAST director, which was successful. Dr. Abass has his section in the newsletter. The other, for a drilling/completions faculty was not successful. This will be redone this year; so, if you know of a good candidate, please let the department know.

Susan and I are planning on attending the Amsterdam ATCE this October. I do hope to see you there. The IADC/SPE Drilling Conference is frequently held in Amsterdam so I can tell you it is a nice place. Although, I will say the place does give a whole new meaning to "window shopping".

### WILLIAM FLECKENSTEIN



Rifle Frac Site

Many thanks to many....

Greetings from Mines. My commitment to act as Interim Petroleum Engineering Department Head ended, and I am transitioning back to my original part-time status in the department. Dr. Erdal Ozkan has graciously agreed to assume the role of Interim Petroleum Engineering Department Head. I would like to thank the members of the extended family of the Mines Petroleum Engineering Department, from the faculty and staff on campus, to the many alumni and supporters throughout the world, for the invaluable help during my tenure. The job of the PE Department Faculty has become more challenging, driven by the continued success of our industry in addressing the world's energy needs, with greater resultant interest in everything associated with our industry. Proof of that interest is the continued growth in the number of students that choose petroleum engineering as a major. Mines has a tradition of allowing students to use their first year on campus to explore their interests and then to pick any major on campus, and students are expressing their interest in petroleum by choosing to enter the PE department in droves. Last year we had 170 seniors and 205 juniors, this year we have 190 seniors and 220 juniors, and I suspect that half the sophomore and freshman classes have stopped by Marquez Hall to kick the tires.

The "shale revolution" is driving this growth and allowing our graduates to command higher salaries and nearly perfect

placement shortly after graduation. Shale development is generating controversy also, with nearly weekly inquiries to my office from the local and national press on the various aspects of development. Is "fracking" safe? Will it hurt the water? Earthquakes? If anyone has watched the "Gasland" documentaries, it is easily understood why these inquiries are coming, and why it is important to ensure that, a Mines education prepares our graduates for the harsh glare of public scrutiny. Shale development is also changing the subject matter of petroleum engineering, since most wells are now being drilled horizontally, and completed with multi-stage hydraulic fracturing. What is the meaning of Darcy flow when it is measured in nano-darcies? How do we use decline curves to predict unconventional reserves? It is a seismic shift in our industry, and we must respond to the changes to continue to provide cutting edge educations to our graduates.



Kuwait project meeting

Once again, the support of the PE Department's alumni and friends, with financial and in-kind donations and time commitments, has been invaluable. The Petroleum Department enjoys a unique relationship with our alumni, industry partners and supporters that has been a tremendous help. For instance, we have had to reach out to fill our gaps; many thanks to John and Jane Wright for assisting us on short notice in finding great adjuncts to teach our Petroleum Economics class when our faculty search for that position was unsuccessful. There are many other examples of invaluable assistance, and many thanks again to the various companies



### FLECKENSTEIN CONTINUED

and individuals that made presentations, or helped with our field sessions, described in detail inside. A special thanks to Schlumberger and Halliburton in particular for their engagement with our department at the highest corporate levels and their investments in our mission.

We have one new faculty that has joined us. We are lucky to have landed Dr. Hazim Abass as the new FAST Consortium director and senior faculty member due to his recognized leadership in both research and applied stimulation expertise. Dr. Abass has worked for the Halliburton Research Center as a team leader in their stimulation department and supervised their rock mechanics lab. He then worked in Venezuela for Halliburton, primarily in soft rock completions. Since 2001, Dr. Abass has worked at the Advanced Research Center in Saudi Aramco, leading the Unconventional Resources Team, after leading a team to develop a roadmap for tight gas and shale development in Saudi Arabia. Dr. Abass will teach stimulation classes at the undergraduate and graduate levels, and will lead the FAST consortium.



We lost a valuable member of our faculty this year. Dr. Todd Hoffman left us to return to his Montana roots, and joined the faculty at Montana Tech. We appreciated his service in PE as the Interim Director of FAST, and the enthusiasm he brought to the faculty and students. He was instrumental in changing our curriculum order to better address the changing needs of the industry and our students. We wish Todd and his family well at his new opportunity.

The students and faculty have continued to accomplish great things – starting with the SPE-ATCE in New Orleans. The students won the Petro-Bowl for the second year in a row, and Dr. Erdal Ozkan, not to let the students get all the accolades, was awarded the prestigious Lester C. Uren Award. I will let you read about the student groups elsewhere in this newsletter. I want recognize the team effort for our faculty

and staff for the success of our summer programs. Nearly 220 students were divided into 4 PEGN 316 field sessions that went to West Texas, California, the Gulf Coast of Texas and Wyoming. The field sessions have continued to be a high light of our program, but truly are an all hands on deck departmental effort. On behalf of the department, many thanks to all who assisted us in making the field sessions such a critical portion of our curriculum.

The Petroleum Department has continued its international outreach from Vietnam to Norway, to our project to assist in an effort to design a new research facility in Kuwait. I have flown to Kuwait now three times in support of this project and I am struck each time by the possibilities for both CSM and Kuwait. The ability to do research that can be pilot tested in some of the world's largest and most challenging reservoirs, which then may lead to technologies with universal applications has great opportunities for all. Further discussions and agreements between CSM and the Kuwait Oil Company are exploring a much closer collaboration using the strengths of both organizations for their mutual benefit.

I have continued to participate in a variety of symposiums and meetings to educate the public on the facts associated with shale development. Supporting this is our continued work on an NSF sponsored project to quantify the risks to the environment from drilling and completion techniques. I have also worked with Dr. Bill Eustes to explore the use of shale development techniques for geothermal energy production. We are proposing to use parallel horizontal wells that are connected by long, induced fracture systems between them to form an Enhanced Geothermal System, with cold water pumped down one horizontal well, through the induced fractures (think fracking again) to harvest the heat, and back up one or more offset horizontal wells to power a conventional electrical generation station. All that is needed is enough rate and heat, for an extended period, to make this a viable energy source. I have also continued to work on patents associated with my research and the commercialization opportunities with those patents.

Mines' PE Department continues to grow and evolve as the environment around us. I again wish to thank all of those who have assisted the department or myself during my brief stay, with special thanks for Denise Winn-Bower and Terri Snyder for their help. The PE Department has great strength, driven by those that have passed through our program. I thank everyone for their continued help to ensure that the next PE graduates had as good of an education as those reading this newsletter. I hope everyone has had another wonderful year and look forward to seeing many of you at the SPE ATCE in Amsterdam this fall.

## HOSSEIN KAZEMI - CHESEBRO' DISTINGUISHED CHAIR



HK, his wife Bonnie at Aspen Mountain for the 50th wedding anniversary

I enjoyed the summer break immensely because I could spend quality time on topics of interest to me. Working with my students in the summer was also satisfying because we focused on research without worrying about classroom lectures and homework. Here is the story of the last twelve months:

**Academics:** In addition to research activity, I supervised twelve PhD graduate students and taught three graduate courses (reservoir simulation, compositional modeling, fractured reservoirs). My research interests revolved around production enhancement both in conventional and unconventional reservoirs. For instance, I worked with students on the role of low salinity on wettability alteration in carbonate cores, and studied the role of salinity contrast in generating osmotic pressure to displace oil from shale core plugs. In the unconventional area, I worked on oil production data from Bakken, Eagle Ford, and Niobrara wells. Two of my students and I continued our involvement with a project on wet-gas production from the low-permeability Lance formation in Jonah field, Wyoming. The objective of this project was to

determine whether the completion technology used in shale reservoirs would benefit hydrocarbon production from low-permeability sandstones. This project is of great interest to me because both shale and tight sandstone reservoirs have very low permeabilities; otherwise, there are significant differences in stratigraphy, pore structure, hydrocarbon source, and migration.

**Travel:** In the last week of May, I attended a SPE workshop on liquid-rich shale reservoirs in Sonoma, California. Two CSM colleagues (Professor Hoffmann and Yin) and I presented talks. This was my first trip to California's beautiful vineyards. In the second week of June, my wife and I visited my family in Paris, France. The weather was very pleasant which allowed us to walk for pleasure, shopping and dining. Finally, in the last week of July, Bonnie and I traveled to Seeley Lake, Montana for our annual family visit and the celebration of our 50th wedding anniversary. The next week we celebrated the event at Aspen Mountain (Picture 1).



Real Colorado U14 Girls Red Team  
Spring 2014

HK Soccer Team

**Entertainment:** I love sports and summer is often a wonderful time for watching great international competition. This year I watched the NBA championship series (not that exciting) and the soccer world cup in Brazil (very exciting). Also, my twin granddaughters came to see us in late July. Both play soccer and are avid skiers. Thus, I spent a few days playing soccer with them and walking along the golf course in the evenings (Picture 2). I hope to see them play for CSM in the near future! Finally, I had to say good bye to my soccer team (Picture 3).

**New Academic Year:** As for the new school year (2014-2015), I look forward to teaching, working with students, colleagues, and our sponsors. Lots of new and exciting projects are on the horizon, which I hope to materialize.



HK with twin granddaughters on Castle Pines golf course



## CARRIE McCLELLAND



"Selfie" with some of our newest alumni – May 2014

I hope that the last year has brought you as much joy and adventure as mine has. I continue to really enjoy teaching here in the Petroleum Engineering Department. I am teaching one of the first courses and one of the last courses that students take here: Fluid Mechanics for Petroleum Engineers and Multi-disciplinary Senior Design. It is fun to watch the students grow in their knowledge and maturity. I also teach field session, and the Petroleum Seminar course where we focus on communication and look closely at our profession and how others perceive us.

Teaching is one of my passions, so I am always looking for better ways to teach our students what they need to know to become the best engineers possible after graduation. Many

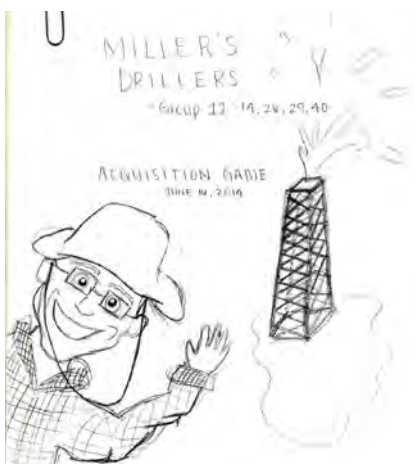
of the professors here, including me, have been exploring new active ways to instruct. This includes what is called "flipping the classroom." With this method, students are required to prepare themselves for class in many ways including watching conceptual videos, practicing with reading quizzes, and starting homework problems. This frees up class time to focus on really investigating the topic, working on mini-labs, answering questions, providing one-on-one and group interactions, and allowing me to interact more with the students beyond lecturing. I feel that the students are getting a lot of quality instruction this way, and I am getting more comments about how students were excited to recognize Fluid Mechanics concepts that reappear in later courses.

Beyond the classroom, I enjoy hiking and travelling. This year I got to visit New Orleans for ATCE, went backpacking in the Rockies, and had many adventures introducing my children to Europe. I look forward to the many adventures that await this year, both in and out of the classroom. I hope to see many of you at ATCE this fall in Amsterdam or as I travel with students for field session next summer.



With my family in the French countryside

## MARK G. MILLER



Miller's Drillers

This year we did an experiment: teach computational methods in computer labs. By increasing the number of sections, we were able to squeeze students into Marquez Hall's two teaching computer labs. This is something students have wanted for a long time. Like most endeavors, it had mixed results. Students who came to class, got

one-on-one help while doing their labs. They didn't have to wait for a TA to show up to the computer lab. They also had instant feedback why things weren't going so well. These things helped. However, because class time was now spent working on labs, it reduced the amount of material that could

be covered. It also led students who were "behind in other classes" to use the computer time to work on those classes. This year, in the interest of continuous improvement, we are going to split time between lecture room and computer lab. It should help everyone.

In addition to teaching, and some continuing computer work, I helped Will Fleckenstein with a few department head duties. I quality checked thesis after thesis. When he was traveling or unavailable, I also approved travel authorizations and expense reports. I looked at course substitution forms and research contracts. It gave me an appreciation for why the department head job is a 24/7 activity.

Finally, I became the Pi Epsilon Tau faculty advisor. The students and I gave building tours and presentations to potential students and their parents. Like last year, our students did a great job speaking about what to expect as a petroleum engineering student and what to expect from a petroleum engineering career.

### RONNY PINI



A "selfie" with my colleague Dr. Claudio Madonna at the TOMCAT Swiss Light Source in Switzerland

This is my first contribution to the PE newsletter as a member of the faculty and only few days are left prior to the one-year mark at Mines. How many things have happened: I taught my first classes, I wrote my first research proposals, I got my first students, I wore steel toe shoes, I visited an oil field for the very first time and I have been on an off-shore platform! Believe me; I could go on and on! This newsletter is a perfect occasion to thank Mines and the PE department for giving me such a great opportunity. At the same time, I am exploiting this brief article to take a moment and think about the year passing by.

I am very happy about my research projects moving forward; we have made substantial progress and have been able to publish three excellent journal papers. Also, I have established fruitful collaborations with colleagues from other universities, thus expanding the network of research activities around the world. In one of such occasions, we have obtained beam time at the TOMCAT Swiss Light Source in Switzerland over the summer. During two slots of eight hours, we performed a core-flooding experiment while observing oil draining water from a mini sandstone core with x-rays. The picture I have enclosed with this letter is a "selfie" taken at 2 AM with my Swiss colleague Dr. Claudio Madonna at the beam line. Since it is hard to see, I have placed an arrow that points towards the mini-core flooding cell. With such a tiny core (6mm in diameter) very high image resolution can be achieved (a few microns), thus creating a unique opportunity to investigate multiphase flow patterns. We are now analyzing a big data set of images and we look forward to pursuing this research project. Over the summer I was informed that one of my research proposals has been awarded that deals with

cap-rock integrity for CO<sub>2</sub> sequestration. This is excellent news and represents a firm point of departure for the new academic year.

It has been a good year with regards to teaching, too. During the spring semester, I co-taught the senior class on Reservoir Engineering II together with Dr. Wu, Dr. Zerpa and Dr. Hoffmann. I am learning a lot from these experiences and I hope the students enjoyed the class as much as I did. Over the summer I have also participated to the field session PEGN 315 in southern California. The field session has been perfectly organized and managed by Dr. Linda Battalora and Al Sami and has presented a great opportunity to get to know part of the sophomore class. Also, I was impressed by the effort made by the oil companies hosting us to show us as much as possible in such a limited time and in a difficult environment, such as an operation oil field or an off-shore platform. Our students have been great and have behaved very professionally, thus confirming once more the excellence of Mines and our department. I look forward to this coming semester where I am going to teach PEGN 413 (the senior lab-class with a very long title). As a matter of fact, I spent some of my summer time working on it; I have revised the manual and prepared new laboratory exercises, one of which deals with my not-so-secret love, which is gas adsorption. The topic is indeed very appropriate for our understanding of the behavior of unconventional reservoirs, such as shales.





### MANIKA PRASAD

Aaah the joys of academia.

I will be on sabbatical in 2014 - 2015 trying out different things. Suggestions on what to do are most welcome! My wonderful students gave me the following:



My Sabbatical started out in Hawaii



Study Geothermal reservoirs



Study fluids!

Have a wonderful year!

Manika

### AZRA NUR TUTUNCU - HARRY D. CAMPBELL CHAIR, DIRECTOR OF UNCONVENTIONAL NATURAL GAS AND OIL INSTITUTE (UNGI)



Climbing up the Great Wall of China near Beijing

Another amazing year has gone by with countless memories. It is so gratifying to watch our graduates, with their newly gained skills, starting their careers. Ten of these new graduates have joined the ranks of our Unconventional Natural Gas and Oil Institute (UNGI) Alumni and had ambitious assignments around the globe last year. Mohammed AlZahrani, Chingiz Bopiyev, Temidayo Kola-Kehinde, Abdelraof Almulhim,

Maxwell Willis, Seung (Frank) Ha Hwang, Christopher McCullagh, and Talgat Kosset from my research group, Simone Steinecker with Dr. Eustes, and Alan Hass with Dr. Andre Revil in Geophysical Engineering have completed their MS and PhD degrees. Please visit our UNGI website (<http://ungi.mines.edu>) for our next wave of the MS and PhD candidates and also learn more about our research consortia progress as well as upcoming events.

We are making significant progress on the research projects at our UNGI CIMMM and Vaca Muerta Consortia. These include projects on the fundamentals of reservoir characterization, coupled geomechanics and fluid transport modeling, coupled geomechanics, acoustic, resistivity and permeability measurements, hydraulic fracturing and production optimization, wellbore stability, well integrity and horizontal drilling in shale reservoirs, other unconventional resources, deepwater reservoirs as well as geothermal energy research. There are many challenges involved in geothermal energy similar to the shale reservoirs, and the geothermal research is rapidly growing besides the shale developments effort. The UNGI Coupled Integrated Multiscale Measurements and Modeling (CIMMM) consortium is also expanding from its focus from Eagle Ford into other US shale basins. We recently included Niobrara, Bakken and Marcellus core measurements

### TUTUNCU CONTINUED

in our research portfolio, with additional preserved cores from CIMMM sponsors.



A few recent UNGI Alumni just after the commencement ceremony on May 10, 2014. From left to right- Abdelraof Almulhim, Talgat Kosset, Azra N. Tutuncu, Maxwell Willis, Frank He Hwang and Chris McCullagh.

The undergraduate petroleum engineering programs in the US have significantly benefited from the daily exposure which Unconventional Resources have been receiving in the news. Petroleum engineering has the highest number of students of all undergraduate programs at Mines. The number of applicants to our graduate program has also experienced a significant increase, and our unconventional classes for Geomechanics and Shale Reservoir Engineering has attracted more than half of our graduate students every semester in the last three years. As part of these classes and UNGI and ARMA Lunch and Learn sessions, we had the opportunity to host many distinguished speakers. "Introduction to Petrel" by Tom Bratton is a great jump into practical applications in the fall semesters for "Reservoir Geomechanics" class. Other invited distinguished speakers from industry included Dr. Mike Lewan of USGS Denver, Mike Mullen and Dr. Tom Doe of Golder Associates, Dr. Lev Vernik of Marathon Oil, and Dr. David Yale of ExxonMobil. We have also received funding to help with the ARMA and UNGI student activities from Shell Oil Company, ExxonMobil and Chevron. Thanks to our speakers, UNGI consortia, and student organization sponsors for bringing the flavor of the industry to our classes.

My students and I are also grateful for our collaborative educational program contributors Schlumberger, Itasca, Golder Associates and CMG for their Petrel, Techlog, FLAC3D, FracMan and IMEX software licenses to be used in my classes and research projects.

In addition to our Mines Alumni, we now have a new group of alumni through our Department of State Unconventional Gas Technical Engagement Program (UNGI-UGTEP) in which we are assisting the Department of State in helping countries to utilize their unconventional natural gas and oil resources and to identify and develop these resources safely. Last academic year, we had the opportunity to deliver two training sessions on the Mines campus (in January and July 2014.) Each workshop was 6 days with a 2-day international version in Hanoi, Vietnam. Dr. Ramona Graves and I taught a full Petroleum Engineering Unconventional curriculum condensed into 2-days in Hanoi. Although the unconventional accomplishments of the US may not be duplicated, these training sessions allow us to share the US experience and the fundamental understanding of the challenges involved in shale gas and oil developments. We contribute to achieving energy security with robust environmental commitment in partnering countries as well as the US economic and commercial interests. In addition, I participated and contributed in the UGTEP program as an invited technical keynote speaker at three of the UGTEP regulatory workshops. Last year, these workshops were organized between the US Department of State and Department of Interior and Chinese, Brazilian, and Botswana governments. They took place in Beijing-China, Rio de Janeiro-Brazil and Gaborone-Botswana respectively. During the Hanoi, Beijing, and Rio de Janeiro workshop, I had the opportunity to visit and give lectures at Hanoi University of Mining and Geology, the PetroChina RIPED center, China University of Petroleum, and the Petrobras and BG Group facilities. This gave me the opportunity to network, meeting other faculty and scientists in these organizations. On another occasion this past summer I was invited to speak at the World Bank Shale Gas Workshop in Latin America.



TOPCORP Module I and II attendees and several UNGI graduate students joined Dr. Eustes and Dr. Tutuncu at Noble Energy Niobrara fracturing operation at Wells Ranch, Colorado in late August, 2013.



### TUTUNCU CONTINUED

This was organized by Brookings Institute in Washington D.C. These international workshops and training sessions, whether they are held abroad or in the US, allow me to meet many colleagues who are passionate about learning US experience in unconventional resources, and as an academician, it is very satisfying to bring our expertise where it is needed for the energy security of many nations in the world.



Several attendees of UNGI-UGTEP Training session in July, 2014 with Dr. Weimer, Dr. Kazemi and Dr. Tutuncu at the Turkey Creek outcrop near Morrison, Colorado

Another unconventional related training program at UNGI is our TOPCORP Regulatory training program. It is being developed in collaboration with Penn State and the University of Texas and supports the rapidly growing shale natural gas and oil development industry to serve our communities in environmentally friendly and safe unconventional shale gas and oil production opportunities. Late August, the Module I and II Pilots were held on the Mines campus, and this June, Dr. Linda Battalora and I taught the Module III program pilot at Penn State University. We have made solid progress in this online program, considering that it was not even planned when TOPCORP was first funded. The pilots for the Modules I, II and III, along with adjoining geology and engineering field trips, have so far provided us with valuable feedback for customizing the curriculum to the needs of regulatory agencies and policy makers. Many thanks to our sponsors ExxonMobil and GE Oil and Gas for their continued support. I would also like to thank the Oil and Gas Commissions in the three states where the universities are located, Colorado Oil and Gas Commission, Department of Environmental Protection in Pennsylvania and Texas Rail Road Commission for their time and collaboration with us to make the TOPCORP program a success. We also appreciate Noble Energy and Anadarko Colorado's Niobrara Asset groups for allowing us to visit their Niobrara wells and production facilities as part of the engineering field trips for the TOPCORP and UNGI-UGTEP training programs. We look forward to further cooperation for the TOPCORP and UNGI-UGTEP programs, as well as our graduate and undergraduate classes and research projects at Mines.



Our guest lecturer Dr. David Yale together with the students after his presentation at my Unconventional Geomechanics class in March, 2014

Thanks to all of our UNGI consortia and TOPCORP sponsors and attendees, Department of States, inventive students, and UNGI faculty members for their contributions to our research and training programs. I look forward to continuing our collaboration to unlock the unconventional resources around the globe as a means for the energy security of many nations. I hope to do this with superior science and technology projects completed in an environmentally sensitive and socially responsible fashion.

Azra Tutuncu  
August, 2014



Several US speakers at the Regional Unconventional Gas Technology Workshop in June, 2014 in Hanoi. From left to right- Paul Ghiotto, Barclay Nicholson, Azra Tutuncu, Gerry Baker, Ramona Graves and Joe Figueiredo



## CRAIG VAN KIRK



Some of us on mountain top June 28 this summer, and my son Sam and I at the same place in 1978 when he was 9 years old

It is my pleasure to contribute my part to the annual PE Department Newsletter with updates over the past 12 months, along with look-backs from the past. My wife Denise and I continue to enjoy good health and good fortune with our kids and their spouses and our 7 grandkids. I hope you and yours are healthy and happy too.

This past school year I “substituted” for several classes and taught several sections, providing me with the normal high levels of satisfaction. Teaching was the main reason I wanted to be a professor, and I have not been disappointed at all since I started teaching at CSM in 1978. This coming school year I expect to accept some invitations to teach some sections of some classes.

This year 2014 marks 40 years since I started traveling internationally in 1974 working with global partners on integrated teams. These days I continue to be very much engaged with long-standing partners globally, especially in North Africa and the Middle East. My first time in Iraq was 1975, and during the subsequent years many times in Libya, Egypt, Oman, UAE, Saudi Arabia, Bahrain, Kuwait, Jordan, Lebanon, and Turkey. I continue to be engaged with all of these countries, as well as China and Russia, and others.

For the first time in my life I am less optimistic about the chances for success for “world peace”, after 39 years of real and measureable progress. Many of my international partners can no longer plan for the long-term, being consumed by the daily task of survival. Even though my personal life is stable and fully satisfied, my global engagements and ongoing projects are more disjointed than ever. This news article I am writing now feels disjointed too.

These days there are so many people suffering at the hands of “bad guys”, and the good people are losing ground in many ways. My own thoughts go to my life experiences that pertain. Here are a few which are at the forefront.

1. Multiple perspectives. If your only perspective in life is the rear end of the lemming in front of you, then you have no chance; but, not all lemmings participate in this annual stupid behavior.
2. Growing up with the Morongo Cahuilla Indians in southern California taught me many good lessons about life. The one that comes to mind right now is “self-determination and control one’s own destiny”.
3. Bullies. At age five I learned how to deal with an 8-year old bully, and that lesson, along with others that soon followed taught me 3 important and useful ways to do this: how to run fast, how to talk with humor, and how to fight. And when to choose which one(s) to use.

In 2011 I wrote a paper and made a presentation at an SPE conference in Bahrain, and here is an excerpt that I want to share with you:

“With the world’s population now at 7 billion ..... need for good education of the youth, preparation for the workforce needs, training of personnel at all levels, international cooperation and partnerships..... and leaders and decision makers to act as role models.....”

“Those of us in the petroleum industry have always had these kinds of opportunities (for more than 100 years) to create ..... international teams, more so than most of the rest of the members of our societies. We know what to do and how to do it; and it is our responsibility to show others how to form healthy international partnerships.....”

In closing this annual news update, I hope each of you is engaged with a variety of people working for the common good, far above and beyond your “job responsibilities”. You can rest when you get old, just like I have been planning to do all my life, and I expect I will do so someday.

I look forward to hearing from you or seeing you at a conference or alumni function.

My best wishes to you and yours, sincerely, Craig Van Kirk



Sacred Mount San Jacinto between my home town Banning and nearby Palm Springs, about 100 miles east of LA. Elevation 10,834 feet. Eleven miles round trip hike. Son Sam, wife Amy, Ellie 13, Gus 18 (2 of Sam and Amy’s 3 kids). Camera view is looking northeast toward Las Vegas and Denver.

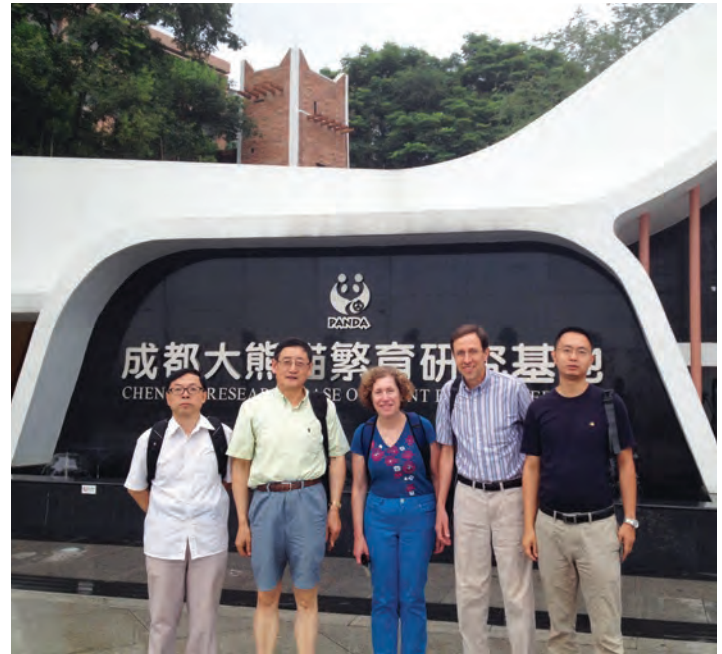


## YU-SHU WU - COMPUTER MODELING GROUP (CMG) CHAIR

It is hard to believe that I have already spent six years at CSM as a PE faculty member. The past five years have been very rewarding and enjoyable to me in every aspect, and they have been among the best years of my life. Among the highlights of the past year was (1) the Wyoming trip for Field Session of PEGN 315 in May; (2) attending several meetings in Germany and Norway in June; and (3) attending the review conference of our "Grand Panda Project," funded by CNPC-USA, in Chengdu, China in July, with Phil Winterfeld and his wife. These highlights are shown in the following pictures.



At Grand Teton National Park with the Wyoming trip of PEGN 315 field session in May



At the "Grand Panda Project" review meeting, funded by CNPC-USA, in Chengdu, China, July 24



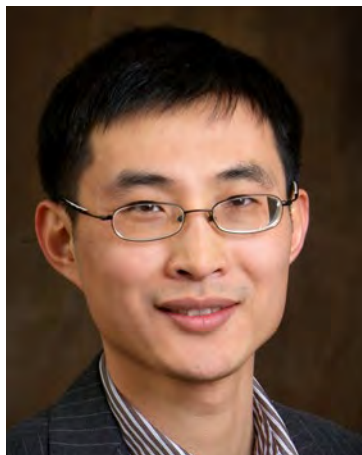
Travel to Germany for meetings in June



At the "Grand Panda Project" review meeting, funded by CNPC-USA, in Chengdu, China, July 24



## XIAOLONG YIN



Xiaolong Yin

Another year has gone by, and it is time again to greet the alumni and friends of the Petroleum Engineering Department!

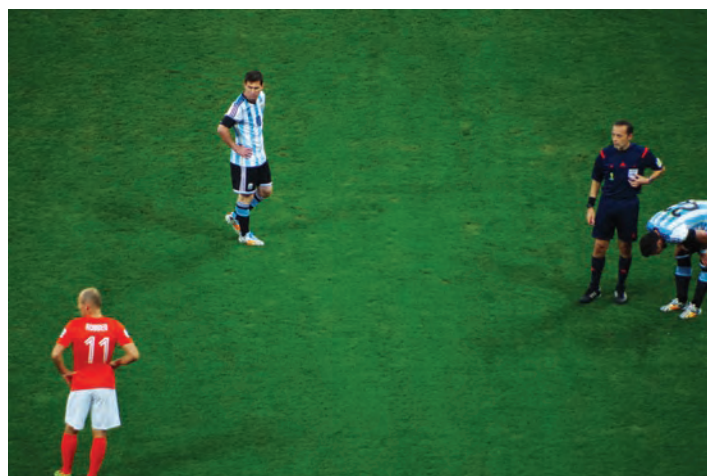
Year 2013 sees the graduation of my first two PhDs. Dr. Ronglei Zhang, hooded in December 2013, is a student that I co-advised with Prof. Yu-Shu Wu. Ronglei developed a fully coupled thermal, geomechanical, and geochemical reservoir

simulator for CO<sub>2</sub> sequestration. He is now working for Chevron. Dr. Feng Xiao, also hooded in December 2013, developed high-performance parallel pore-scale flow and transport simulators. He is now working for ExxonMobil.

Our group is currently working on several industry-funded and government-funded projects. The main research theme is computational fluid flow and phase behavior. We use Direct Numerical Simulation (DNS) to tackle the fluid flow equation in complex systems such suspensions and porous media. We are interested in stability and cluster formation in gas-solid particulate flows (National Science Foundation), and slip flow of gases through nanopores of tight porous medium (Petroleum Research Fund, American Chemical Society). In addition, we presented and published several papers on phase behavior of petroleum fluids in nanopores. In microfluidics and nanofluidics, Keith and I published our collaborated work (see figures below) on oil-water displacements in nanochannel and microchannel networks. In geomechanics, our collaborative project with Pioneer Natural Resources (headed by Dr. Yu-Shu Wu and funded by US Department of Energy) research cryogenic fracturing has also made great progress – we are going to fracture rocks with liquid nitrogen!

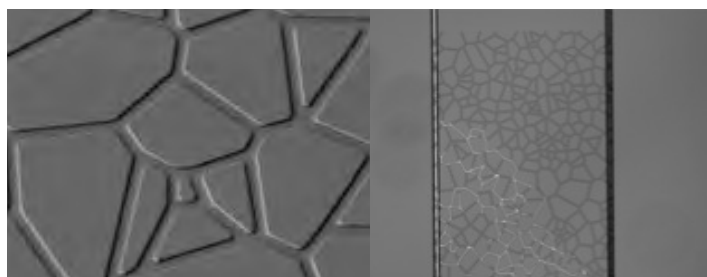
Water (dark fluid – dyed with food color) displacing mineral oil (colorless) from random porous media models embossed on polymer microfluidic chips. (a) and (c) are for brine flooding and (b) and (d) are for surfactant flooding. This work will appear in Physics of Fluids.

I continue to teach PEGN 310 Fluid Properties, PEGN 315 Field Session I, and PEGN 601 Applied Mathematics. The enrollment is now somewhat “stabilized” at about 200 in PEGN 310 and PEGN 315. Coordinating classes of this size has involved a lot of work ... luckily we are assisted by great teaching assistants, and, for the case of PEGN 315, the support we received from our alumni and companies is simply unparalleled.



Semi-final – Robben vs. Messi

Being a soccer fan, the summer of 2014 was a festival as the World Cup returned to Brazil. My wife and I acquired some tickets and we watched games in Brasilia and Sao Paulo. It was a great trip as I have never been to the Latin America. It was also an unforgettable tour about football, people, and culture.



Nanochannel network etched on a silicon substrate and image of water-oil displacement from an experiment. Reference: SPE 169147 – SPE Improved Oil Recovery Symposium, 2014.





### LUIS E. ZERPA



Me and baby Eva

This was certainly a very exciting academic 2013-2014 year. As my first year as a member of the faculty of the Petroleum Engineering Department at Mines, I had the task of teaching PEGN 423 Petroleum Reservoir Engineering I. It seems that my efforts preparing the course last summer and the advice received from Dr. Van Kirk really paid off, to continue with the high quality of the reservoir engineering course. The course was well

received and met the expectations of the students, to a point that the senior graduating class elected me for the Outstanding Faculty Award. I humbly receive this award, thank all students for their collaboration with the delivery of the class, and of course, thank the team of Teaching Assistants (TAs) that help me with the organization and grading of the class. This coming year we are expecting a larger class with nearly 200 students, and I am currently working with my TAs to get ready for teaching this course; challenge accepted!

I did not have the chance to say good-bye to the graduating class of 2014, since I was with my wife at the hospital for the birth of our first child during their final exam. I wish all graduates of the Spring 2014 commencement ceremony a successful professional career and a prosperous life as Petroleum Engineers. We count on you as representative of Mines to keep moving forward our profession with the highest standards of ethics and professionalism, and I am sure all of you are up to the challenge.

This past academic year, I started new research projects and included graduate and undergraduate students in my research

group. We got a research grant from DOE in collaboration with another researcher from the National Renewable Energy Laboratory (NREL), to study the extraction of geothermal energy from sedimentary basins. This project is continuing for a second year, thanks to the effort of one graduate student and three undergraduate students. I started preliminary research with two graduate students in the area of natural occurrence of gas hydrates in sediments, with the aim of getting results that can lead to funded research proposals. I continue my collaboration with Dr. Kazemi in the Marathon Center for Excellence for Reservoir Studies (MCERS) where we are working in the integration of microseismic with reservoir modeling for the management of waterflood projects, and with the Center for Hydrate Research, where we are working on flow assurance projects. Currently, I am supervising the research work of nine students, including Ph.D., Masters, and undergraduate students. If you would like to learn more about these projects or get involved in similar research areas, I will be happy to provide information about these subjects.

This was a busy, challenging, and exciting academic year for me. It is gratifying get to see the students mature intellectually and get ready to start their careers and, at the same time grow a family in Colorado. Hopefully, I will get to know more about your professional achievements over this next year. I know on my side that this is going to be an interesting academic year. I wish you the best in your career and personal endeavors.



Luis Zerpa at Kafadar Commons

### PHIL WINTERFELD



Dr. Winterfeld and Amy visiting the Great Wall in China

This past year has seen a number of exciting developments in my research for the Energy Modeling Group (EMG).

I continued work on the DOE CO<sub>2</sub> storage project, "Simulation of Coupled Processes of Flow, Transport, and Storage of CO<sub>2</sub> in Saline Aquifers." My work was published last spring as a chapter in the book "Computational Models for CO<sub>2</sub> Geo-sequestration and Compressed Energy Storage," edited by R. Al-Khoury and J. Bundschuh, available at your favorite on-line technical book seller. Although this CO<sub>2</sub> storage project ends later this year, our research in this area will continue. We were awarded a three-year grant by DOE to study flow and storage of CO<sub>2</sub> in fractured reservoirs. We are all looking forward to beginning this project in the fall of 2014.

## WINTERFELD CONTINUED



Baby panda in incubator; not shown is the policeman nearby ready to enforce the sign in any language whatsoever

Modeling CO<sub>2</sub> flow and storage is an intensely computational endeavor, crunched by our cluster computer, EMGCluster. We upgraded EMGCluster this year, doubling the number of nodes from 16 to 32, increasing the number of processors from 256 to 640, and switching to Infiniband for inter-processor communication. These upgrades have greatly increased the cluster's speed and memory, allowing us to run much larger simulations.

I have also been working on a CNPC (China National Petroleum Corporation) project for developing a simulator that couples reservoir flow and hydraulic fracturing. This simulator, like the CO<sub>2</sub> models above, solves the equations governing both fluid flow and geomechanics. A trip to China was included in the project, and my wife Amy and I went there last summer where I presented a workshop to CNPC on running our hydraulic fracturing simulator. We had a wonderful time and visited the Great Wall north of Beijing and the Research Base of Giant Panda Breeding in Chengdu.



## AL SAMI



Al speaking at the U.S. House of Representatives

interact with the sophomore and senior students in many different ways to share what I know, with them and learn from them.

Another splendid part of my professional life in CSM is working with the brilliant grad students that I learn from, not to mention the great faculty and staff that I work with in PE department.

Often we enter in the discussion with the students regarding their concerns about the future of the oil industry. The instable and recent fluctuated oil price in particular, can be felt from their expressions. Despite public perception, lower oil price could slow down the production and cause less drilling, which is against the core policy of the new administration for increasing the domestic production. Importing the foreign oil resonated from the lower price of the oil and less profit for domestic producers could bump up the already-inflated unemployment rate to the next level. Could this cause less number of students for our department? Yet, to be determined.

Needless to say, CSM's PE Department is playing a significant role in sending numbers of highly capable and knowledgeable young engineers to the oil industry. This is as the direct result of the wealth of knowledge and capability of the educators that PE Department poses.

In every minute of the past eleven years, I've been proud to be a part of this system. Mostly, appreciating the opportunity to





## PE STAFF

### FROM THE PE OFFICE STAFF



Denise and AJ's mother celebrating his graduation

Another year has flown by! With the PE enrollment growing every year, we are busier than ever.

We sent 260 students, faculty, staff and teaching assistants to four different places for the PEGN 315 Field Session. Denise traveled with the Denver/Midland group. Terri decided to forgo the field session this year and travel with her daughter Kathryn, who was studying abroad.

They traveled in Spain, Portugal and the Swiss Alps. It was an awesome adventure with many new experiences, but



Terri and Kathryn in Sentra, Portugal

she was sad she didn't get a chance to say goodbye to the 2014 graduating class.

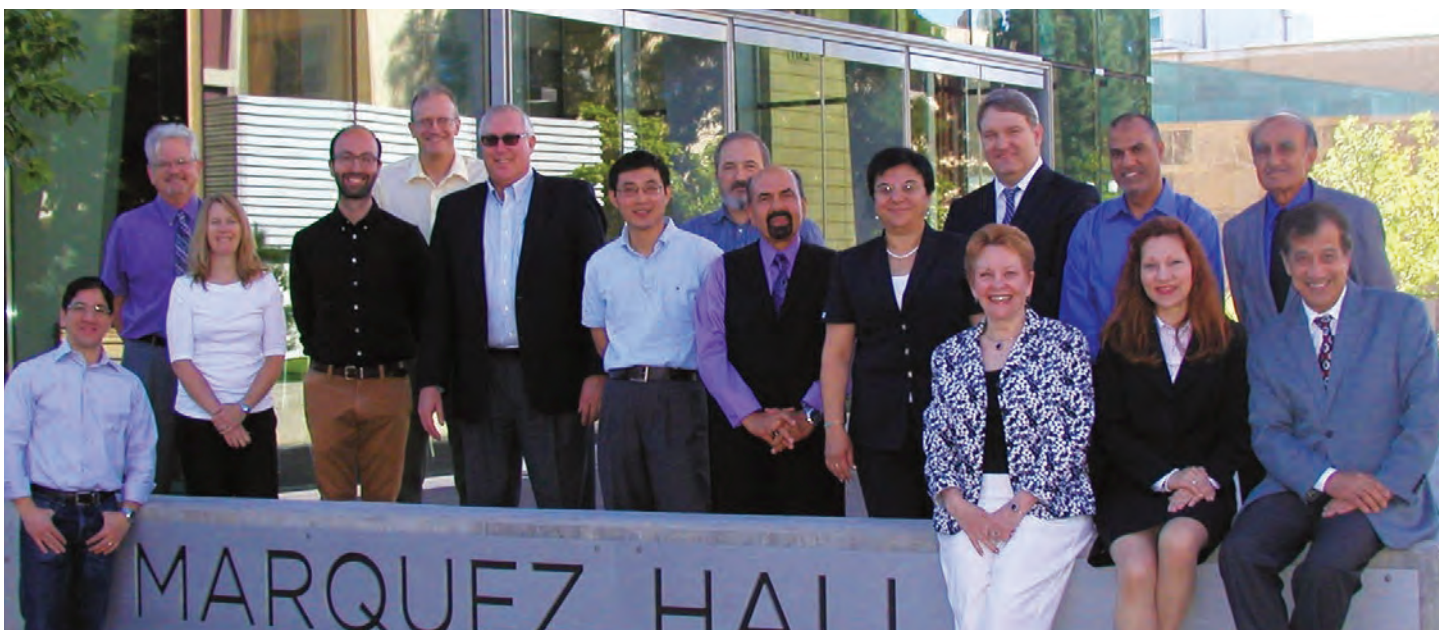
We also want to welcome Emilia Clayton as the newest member of our staff in Petroleum Engineering. She started working at Colorado School of Mines in spring 2014. She is working across five research groups and is responsible for finance and research administration. She moved to Colorado from Chicago where she was employed for 10 years by the Illinois Institute of Technology as a Research and Budget Manager. Emilia loves camping, traveling and adventures with her family. She lived in Chicago for 12 years but is originally from Poland and accustomed to great skiing and is excited to restart her hobby as soon as this winter! Her husband is a geologist from North Carolina. Her son loves to do everything and anything outdoors so the sky is the limit.

We wish the best and always encourage you to stop by the office when you are on campus.



The newest PE staff member, Emilia Clayton

## PE FACULTY



1st Row-Luis Zerpa, Ramona Graves, Linda Battalora, Hazim Abass. 2nd Row- Bill Eustes, Carrie McClelland, Ronny Pini, Mark Miller, Tom Bratton, Xiaolong Yin, Erdal Ozkan, Al Sami, Azra Tutuncu, Will Fleckenstein, Mansur Ermila, Hossein Kazemi (On Sabbatical- Manika Prasad, Yu Shu-Wu)

### SOCIETY OF PETROLEUM ENGINEERS



**CSM SPE Student Chapter President,  
Doug Wilson**

Our Colorado School of Mines Student Chapter of the Society of Petroleum Engineers continues to grow and succeed. As the opportunities for oil and gas industry professionals expand, so does our organization's scope and responsibility. Our 2014 roster stands at 310 active members. Our membership is dominated by new undergrads who are eager to participate and learn. Even our leadership has grown; we were recently able to add a new officer

position, Webmaster Co-Chair, to assist our member outreach. We are also mulling some innovative ideas to further engage our members through various media, like Snapchat and YouTube.

Chemical Engineers, and American Institute of Mechanical Engineers, we hosted a campus-wide barbecue sponsored by BHP Billiton. This event allowed over 350 Mines students to enjoy food and music on a beautiful spring afternoon. We are looking for further opportunities to work with our fellow campus organizations in the coming year.



**The sharp-shooting CSM SPE Sporting Clays competition winners  
display their prizes**



**Our 2013 international champion PetroBowl team, from left to right: Interim Petroleum Engineering Department Head Dr. William Fleckenstein, Team Captain Doug Wilson, Murat Syzydkov, Erich Kerr, Stewart Barber, and Darkhan Maulimgazy**

This past semester we hosted ten lunch and learns. These on-campus educational lunches are presented by industry professionals and are easily the most popular and well-attended SPE events. The lunch and learns offer our members many and varied opportunities. Some lunches focus on the work environment and the transition from student to engineering professional. Others focus on technology, business, or industry economics. We have several lunch and learns already scheduled for the upcoming fall semester, and are on track to meet or beat the number of previous years' events.

Last April, along with fellow campus chapters of the American Association of Drilling Engineers, the American Institute of

Our major spring fundraising event, the CSM SPE Sporting Clays Competition, was held last April as well. This event was held at the picturesque Kiowa Creek Sporting Club, in Bennett, Colorado. Our student members were paired with industry professionals for a fun day of competitive clay shooting, with lunch and refreshments. The clay shoot raises money for Chapter operating expenses, and allows our members to interact with experienced engineers in an informal setting.

March saw our annual Joint Session of the local SPE Section General meeting. We had a record turnout of 175 Denver Section and Mines Chapter attendees on campus, as well as a strong showing of University Administration, to enjoy a fine dinner and technical presentation. The presentation featured an experienced panel of local professionals. On stage were: Stuart Ellsworth, Engineering Manager at the Colorado Oil and Gas Conservation Commission; Jerry Sommer, CEO and President of Tekton Energy; Mike Eberhard, Completions Engineering Manager for Anadarko Petroleum; and Doug Hock, Manager of Media Relations for Encana Corporation. These fine gentlemen spoke knowledgeably and thoroughly about local industry challenges in the growing Colorado oil and gas plays.

Overwhelmingly the highlight of the last year, however, was our participation at the 2013 SPE Annual Technical Conference and Exhibition, held last September in New Orleans. Our Chapter helped organize and sponsor the attendance of over 140 student members. The ATCE is regularly the largest and most diverse SPE-sponsored event. It is home of the premier academic knowledge-bowl competition for petroleum engineering students: PetroBowl. The Colorado School of Mines



## STUDENT ORGANIZATIONS

### SPE CONTINUED

competed against 32 teams from around the world and, once again, defeated the entire field to take home the international championship PetroBowl trophy. This year's ATCE will be held in Amsterdam. We are helping 55 of our members, including a capable new PetroBowl team, travel to the upcoming conference. Our strong showing at ATCE is a continuing source of pride for our entire organization.



Orediggers enjoy the Field Day activities at E-Days.

### PI EPSILON TAU



Hanna Madden

It seems pretty unbelievable that we have been in Marquez Hall for two whole years. How the time has flown! Since then, the department has grown a great deal. Obviously everyone is realizing that Petroleum Engineering is the place to be.

My name is Hannah Madden, and I am the current chapter president of Pi Epsilon Tau. It is such an honor to be a part of this organization which represents the Petroleum

Engineering Honor Society for Colorado School of Mines. Pi Epsilon Tau was started at the University of Oklahoma in 1947, and our CSM chapter was founded in 1983. We are a group that represents both graduate and undergraduate students who showcase not only high academic standards, but also high leadership and integrity principles. Pi Epsilon Tau is dedicated to enhancing student involvement on campus, in industry, and in the community. Our group conducts and participates in different events each year such as Castle of Cans as well as Discover and Preview Mines. Each spring we hold an initiation event where we welcome the newly selected students to the organization.

Throughout the year we had great success in giving tours of Marquez Hall during the Discover and Preview Mines events held on campus. It is such a great opportunity to be able to interact with high school students and explain our interest in the oil and gas industry. We spoke with prospective students and their families from all over the country about

what Petroleum Engineering is really all about, and answered many sometimes difficult questions about the business.

Although Discover and Preview Mines are the biggest events we participate in for the Petroleum Department, Pi Epsilon Tau also partakes in other events on and off campus. Castle of Cans (a school-wide food drive) was a great opportunity for our organization to give back to the community. We also held a shop tour at Well Master Corporation, a local oil and gas company specializing in plunger lift. It was a fun and educational opportunity to connect with professionals in the industry and learn about their operations.

During the spring, we initiated an amazing 97 new members to Pi Epsilon Tau, all notable representatives of the Petroleum Engineering Department. And as always, it was a pleasure to welcome our esteemed faculty to the ceremony. We also had pins created for the members of Pi Epsilon Tau; they turned out great and will undoubtedly serve to be long time keepsakes. In fact, we had a lot of interest in the pins from alumni at the Career Fairs. It was great to see so many successful Pi Epsilon Tau graduates.

I would also like to thank our whole officer team from last year for all of their help and dedication in advancing our Pi Epsilon Tau Chapter to where it is today. I'm very excited for everything this year has in store, and I know it will be a successful one. Our newly elected officer team consists of some dedicated engineers: Daniel Fullerton, Tyler Barela, Jordan Tucker, Cooper Minetti, Trey Sloan, and Matt Balderston. We are also excited to welcome back Dr. Miller as the faculty advisor to Pi Epsilon Tau. His input the past two semesters has been invaluable, and with his help I believe the organization can do some truly great things this year. I would like to end with a huge thanks to the whole Petroleum

## STUDENT ORGANIZATIONS

### PI EPSILON TAU CONTINUED

Engineering Department at Mines who make being a student in the department a true honor. Without your knowledge and dedication, our students would not be recognized as some of the best Petroleum Engineers in the industry today.

Cheers,  
- Hannah Madden



2014 Pi Epsilon Tau Initiation



### AMERICAN ASSOCIATION OF DRILLING ENGINEERS



William H. Stevens

The past year has been an exciting and productive one for the American Association for Drilling Engineers (AADE). Our membership has grown to nearly 200 students, and we successfully provided our members with learning opportunities outside the classroom through numerous Lunch-and-Learns, Well Control Certification classes, site visits, and fishing workshops.

Wild Well Control hosted a basic well control class for 24 of our members in March. It was a great opportunity for the students to obtain a professional certification. A special thank you goes out to Mike Vertner for hosting such an important class. We look forward to having Wild Well back again in November.

Weatherford Fishing & Re-Entry has hosted fishing workshops for our members twice in the last year. Students learned about casing exits, fishing tools, and completions during an all-day session at Weatherford's Longmont facility. Thank you to George Stewart for conducting these great events.

We were pleased to host BHP Billiton's Annual Campus BBQ again this year. As always, the BBQ had great food and music, as well as the opportunity to mingle with industry professionals.

The AADE National Fluids Conference in Houston, Texas, last April hosted new technology and information regarding drilling fluids. We were excited to have over 30 of our members in attendance. We are already planning our trip to the National Conference in San Antonio this coming April.



Students enjoying a beautiful day and great food at the Fin, Feather, Food Festival (5F)

Each year, the Denver AADE Chapter hosts Fin, Feather, Fur Food Festival (5F) at the Jefferson County Fairgrounds. This festival is a great opportunity for AADE student members to give back to the Denver Chapter through volunteering with set up, ticket sales, hospitality, and clean up. We look



# STUDENT ORGANIZATIONS

## AADE CONTINUED

forward to this festival every year due to its huge industry support, and were proud to provide 20 student volunteers to help out this year.

Throughout the school year, the AADE Denver Chapter hosts bi-monthly meetings. These meetings are especially important for AADE student members to attend for networking opportunities as well as showing our appreciation for their continuing support and dedication. Not only does the Denver chapter hold general meetings, but they also award scholarships to our members each year. We greatly appreciate their generous support.



BHP Billiton helped us throw one of the biggest campus parties of the year.

I would like to personally thank all my officers for making this year so successful for our chapter. I would also like to extend special gratitude toward Dr. Alfred Eustes, who continually provides expertise and support.

Any questions, comments, concerns, and/or involvement is always welcome and encouraged. Please feel free to contact me at [wstevens@mines.edu](mailto:wstevens@mines.edu).

Best Regards,

William H. Stevenson  
Colorado School of Mines AADE Student Chapter President

**President**  
**Vice-President**  
**Secretary**  
**Treasurer**  
**Webmaster**  
**Parliamentarian**

William Stevenson  
Lance Vadla  
Jeff Olson  
Edward Wolfram  
Justin Cameron  
Elizabeth "Lizzy" Reale

### Events Committee

Jennifer Mahoney  
Benton Ellis  
Stephen Lawson  
Daniel Fullerton  
Lyle Hanson  
Walt Baker



AADE hosted the Oil Olympics during E-Days at Mines.



### AMERICAN ROCK MECHANICS ASSOCIATION



Anton Padin, ARMA-CSM President  
2013-2014

The Mines Student Chapter of the American Rock Mechanics Association is a young engineering and scientific organization that promotes interaction among students on rock mechanics and geomechanics, with a special emphasis on the development of frontier oil and gas resources.

With the advent of onshore unconventional oil and gas, ultra-deepwater drilling or pre-salt drilling among

other challenges, integration between rock mechanics and the traditional petroleum engineering sciences has become crucial for the economic development of (previously) locked petroleum resources. ARMA-CSM intends to fulfill the increasing interest from the oil industry and the academia by promoting the significance of rock mechanics and transferring knowledge from experts to the students of Colorado School of Mines. Although we are a recently established organization, the number of affiliates is growing every year and we expect to see this trend continue throughout the 2014-2015 academic course.

The 2013-2014 academic year activities started with the organization's participation in the "Celebration of Mines by Starlight" event. The former officers succeeded by keeping the ARMA booth one of the most popular visiting sites during the event. During the academic course, the organization hosted several lunch and learn sessions and lectures including those with technical experts such as Dr. David Yale of ExxonMobil, who provided us insight on the use of geomechanics in heavy oil recovery; Dr. Michael Lewan of USGS Denver, who showed us new insights and paradigms of kerogen maturation and formation of oil and gas; Mr. Mike Mullen of Stimulation Petrophysics, that encouraged debating about the applications of fracturing in unconventional resources; and Dr. Lev Vernik of Marathon Oil, who highlighted the implementation of rock physics in organic shale formations. We also collaborated with SPE, AADE and UNGI to organize several joint L&L gatherings

at Mines campus. Those activities wouldn't be possible without the enthusiasm and support of our Academic Advisor and former ARMA President Dr. Azra N. Tutuncu and, of course the sustained work of our officers Chris McCullagh (Vice President), Maxwell Willis (Event Coordinator), Mehdi Mokhtari and Asm Kamruzzaman (Treasurers), Binh Bui (Webmaster) and Ilkay Eker (Secretary). In addition, economic support from ExxonMobil, Chevron, Shell Oil Company, Marathon Oil, and the Student Government at CSM helped sustain the organization's activities throughout the year. We thank our sponsors and look forward to their continuous support in this academic year and beyond.



Field trip to the Niobrara Formation Outcrops in Lyons, CO

Being one of the hottest topics in recent years amongst the oil and gas engineering community, I certainly encourage new and returning students, both undergraduates and graduates, not only to join ARMA and attend the lunch and learns, lectures, and field trips, but also to contribute with their own ideas and enthusiasm to the growth and health of our student chapter. New officers will be elected at the beginning of the Fall 2014 semester. Thus, if you are already a member, I encourage you to continue your membership to ARMA and if you haven't had opportunity to get familiar with the organization, please apply soon and express your thoughts to help this organization better help the Mines Community. Please visit our website to learn more about our organization and activities and also fill an application form at <http://organizations.mines.edu/arma/member.php>.

It's been a pleasure to serve the organization, and I hope 2014-15 will be a prolific year!

Anton Padin,  
2013-2014 ARMA-CSM  
Student Chapter President



Lunch & Learn with Dr. Michael D. Lewan organized by ARMA in 2013-2014



### PEGN 315 - DENVER/MIDLAND TEXAS FIELD SESSION By Xiaolong Yin

The Denver / Midland group has 44 students and was managed by Manika, Denise, and myself. We had three graduate teaching assistants: Matt Herzog, Lei Wang, and Binh Bui. David Buorquin, Shea Boynton, and Daniel Chase served as our backup drivers. The first week was spent in the Denver area, and we visited the Edgar Experimental Mine, **Halliburton**, **QEP Resources**, **National Renewable Energy Laboratory**, **Anardarko**, and **Evraz's Seamless Pipe Mill** in Pueblo. In the second week, we visited **Chevron**, **Pioneer**, **Devon**, and **Oxy** in Midland, Texas. We had great times with all the places that we visited. We are thankful for the support from all the companies and alumni that made the trip possible. We also thank the teaching assistants and backup drivers for their great service to the faculty and students.

The summer field session started with a winter storm. On Monday morning, everything outside was white. We had to cancel the trip to the Edgar Experimental Mine in Idaho Springs due to the wintery driving conditions up I-70. In the afternoon, we visited the **Halliburton** Service Facilities in Fort Lupton. The facility is in the Northeast suburb of Denver, and is a short 40-minute drive from Golden. We watched the demonstration of fracturing fluids, looked at the pumping trucks in the yard, and saw a great short video of an aerial panoramic view of a fracturing site, taken by a drone.



Halliburton's Sand Castle in the yard of the Fort Lupton Facility

**Tuesday, May 13:** In the morning, the group visited the Edgar Mine in Idaho Spring. The mine is operated by the Mining Engineering Department of the Colorado School of Mines. It no longer makes ores, but is a great site for education, practices, and, of course, visitors that are curious about rock formations and mining operations. The manager, Matt Schreiner gave us a tour of the mine and introduced to us the impact drilling equipment, blasting faces, horizontal and vertical shafts, and their functions. Though not a reservoir, the Edgar Mine is a

great opportunity to observe the complexity of the underground formation in situ.



Mine Manager Matt Schreiner giving lecture to the students

We left the Edgar Mine at about 10:30 and headed to the light rail station. We then took the light rail to downtown Denver. The destination for the afternoon was **QEP Resources'** headquarter. **QEP Resources** is a leading independent oil and gas producer. After the CEO's greeting to the students, a very nice lecture was prepared to give the students a full exposure to the various components of Petroleum Exploration and Production (E&P). After the lecture, several Mines' alumni came and shared their work experiences with the students.



Lecture held by QEP Resources

**Wednesday, May 14:** We visited the **National Renewable Energy Laboratory** in Golden, which is a 10-minute drive from Mines. **NREL** has extensive research in all aspects of renewable energy and has close research connections with the Colorado School of Mines. Specifically, faculty in the Petroleum



## FIELD SESSIONS

### COLORADO/MIDLAND CONTINUED

Engineering Department have been involved in several drilling and reservoir studies of enhanced geothermal systems.



NREL's energy systems integration facility won 2014 R&D 100 Lab of the Year.



PE Alum Ryan Helmer (center, talking) introducing the students to the Wattenberg field

**Thursday, May 15:** We spent a wonderful day with **Anardarko**. The activities started in the morning with a full lecture on field development in the Wattenberg field. Following the presentations, we went north of Boulder and looked at the Wattenberg outcrops on the road side of US 36. After a picnic lunch, we drove east into the Wattenberg field and looked at the drilling and fracturing operations.

**Friday, May 16: Evraz** is a US steel manufacturer that makes flat, long, and tubular products. Its seamless pipe mill in Pueblo makes tubular goods that are used in the petroleum industry. We visited the mill in the morning. The manufacturing process takes the steel billets, heated and then pierced them to make seamless tubing. It is a great showcase of \*how things are made\* and how the petroleum industry works with other industry in developing the tools of trade.



Ever started the field session in the snow? - Geared up for the Edgar Mine



## FIELD SESSIONS

### COLORADO/MIDLAND CONTINUED



Look at the outcrops.

**Monday, May 19:** The big bus took the students to the **Chevron** training facility in Midland, as the rest of the drivers and vans followed. The facility was very enlightening for the training equipment had cut-outs to see the insides which allowed us to see how the equipment worked.

**Tuesday, May 20:** Allison Oien hosted us at **Devon** and provided us with a tour of their production field. Students received detailed explanations of what technologies were implemented in these fields.

**Thursday May 22:** **Oxy** provided us with an excellent 4 station tour of all of their facilities, allowing us to see a work over rig, battery station, drilling rig, satellite equipment station. We finished the day off with a great BBQ.

With the increasing number of students and the number of groups in PEGN 315, we are very grateful that companies and the personnel involved devote so much time and effort to continuously support our unique summer program. Here,



Group photo taken at the Mill. Manager Chad Ones is on the far right.



## FIELD SESSIONS

### COLORADO/MIDLNA CONTINUED

we specifically acknowledge PE alumni that helped with the contact and organization of the trips: Christopher Hatcher (**Halliburton**), Victor Eifealtdt (**QEP Resources**), Yuanhai Yang and Ryan Helmer (**Anadarko**), Paul Onsager and Katherine Gallagher (**Pioneer**), Dan McCorkell and Alison Oien (**Devon**), Brent Vangolen (**Oxy**).



Students touring with Devon



Alum, Brent Vangolen hosting the group at Oxy



Chevron Training Facility



## FIELD SESSIONS

### PEGN 315 CALIFORNIA FIELD SESSION 2014 By Linda Battalora

Thanks to the generosity and enthusiasm of our many alumni and friends, the 2014 PEGN 315 California Field Session was a great success! Fifty-six students, Al Sami, Ronny Pini, Teaching Assistants Jason Downey and Lyle Hansen and I made a loop starting in Huntington Beach, moving on Bakersfield and finishing our last tour in Ventura.



Alum, Mike McCarter, with students and California Department of Fish and Wildlife representative at OXY Huntington Beach.

CSM alum Mike McCarter (**OXY**) designed a full day in Huntington Beach including a safety meeting, breakfast, drilling rig tour, facilities tour, meeting with representatives from the California Fish and Game Division, tour of adjacent wetlands and sensitive areas, lunch and a tour of Tiger Wireline Shop in Signal Hill. From there, we headed to Bakersfield where we set up "camp" at the Homewood Suites for five nights.

On our first full day in Bakersfield, **AERA** engineers and CSM alums Angie Ransom, Travis Ransom, George Hunsaker, Ryan Stef, Jeff Kim, and Stacie Gallegos led us to the Bellridge Field for breakfast, tour of field operations in progress (drilling, completion, stimulation), lunch at **AERA** head quarters and an opportunity for informal conversation with CEO Gaurdie Banister, Jr.

We spent the next day with **OXY** at Elk Hills. This was a fantastic opportunity for the students to learn about the former U.S. Naval Petroleum Reserve, tour a drilling rig in action, the gas facility and amine plant, production rig and emergency services center. Many thanks to Mike LeBaron (PE alum) for arranging our tour and hosting us at Elk Hills!



Group photo at The Chevron Kern River Field

On Friday, CSM alum Elliott Riege guided us on a tour of **Chevron's** Kern River Field and operations center, and provided presentations on the history of the field and Chevron. We would like to thank **Chevron** for this educational tour, lunch and for generously sponsoring our Field Session this year.



Our annual Alumni event, "Evening with Industry", at the Bakersfield Petroleum Club

On Friday night, we enjoyed an "Evening with Industry" organized several of our PE alums. We would like to thank the following alums and their companies for organizing and sponsoring this annual event: Kelsey Gallegos (**DRILTEK**), Dave Mayer (**AERA**), Elliott Riege (**Chevron**), Mike LeBaron (**OXY**), Lonnie Kerley (**Freeport McMoran**) and Josh Yurkanin (**Holmes Western**).

### CALIFORNIA CONTINUED

On Saturday, geologist Mike Ponek (**Chevron**) and Dave Mayer led us on a half day field trip of San Joaquin Valley oil field history and geology. Highlights of the day included the McKittrick Tar Seeps, West Kern Oil Museum, and Lakeview Gusher. We would like to thank Fred Holmes for generously sponsoring a barbecue lunch for us at the West Kern Oil Museum.

Another highlight of this year's CA trip was a specially arranged tour at Vandenberg Air Force Base. In the morning we learned about base history and its participation in the United States Space Program. In the afternoon, we were led by the base geologist on a geology tour of the Monterey Shale located on an exquisite portion of the Pacific Coast.



Exploring the Monterey Shale at Vandenberg Air Force Base

While making our way down the Pacific Coast, Jon Schwalbach, Plamen Ganey and Dave Mayer (all of **AERA**) led us on a geology tour on Shell Beach. In addition to a beautiful day on the beach, we reviewed basic geologic concepts, learned about regional fracture development, structural traps and worked through a team-based exploration and lease bidding problem.

On our last day in California, we divided into two groups and enjoyed a comprehensive tour of **Venoco Inc.'s** Platform Gail. The morning boat ride is always exciting only matched by ingress and egress to the platform. We thank the **Venoco** folks for providing safety training, snacks on the boat and platform, and for their generosity in arranging the platform tours.



Riding the "FROG" from the Venoco Offshore platform

The field session in Southern California would not be possible without the generosity of our alums and friends in the area. The students, TAs, Staff and Faculty had a wonderful learning experience and another enjoyable visit to California. Thanks again! We hope to see you next year!





## FIELD SESSIONS

### PEGN 315 FIELD SESSION - HOUSTON By Joe Chen – Lab Coordinator

I had the great opportunity to travel to Houston and really most of Texas this year for PEGN 315 field session. We had a great bunch of students getting a comprehensive introduction to the petroleum industry. The field session was organized and lead by Professor Erdal Ozkan. We had a total of 53 students and 7 graduate students that served as Teaching Assistants. The TAs challenged the students with great questions and answered many questions to help the undergraduates understand what goes on in the field. The group consisted of Lia Rojas, Wisam Asirri, Samat Bekov, Murat Syzdykov, and Hulya Sarak.

We started the trip on Tuesday with a visit to **Marathon Oil Corporation**. We were graciously hosted by Mines alumna, Basak Kurtoglu. She and four other Mines alumni shared their experiences working for Marathon Oil and careers after graduation. In the afternoon we toured the Energy Museum courtesy of Marathon Oil. We got to see a lot of exhibits showing the different tools, rigs, and equipment used in the petroleum industry.

Wednesday, we visited **Baker Hughes** and toured the Hughes-Christensen Drill Bit Manufacturing and Testing Center in the Woodlands. The students were able to get a firsthand look at the different types drill bits used and how they are made. They also had a nice collection of the history and evolution of drill bits on display in their lobby. In the afternoon we visited **Schlumberger's** Rosharon facility where the students got a great education in shaped charges. They learned orientation (phasing), shot density, wiring, and penetration effects. The group was on hand when one of the charges went off in their testing facility.

On Thursday morning we visited **H&P Rigs**. We were shown how their rigs are manufactured and their influence on the drilling industry. The biggest impression made on the students were the Flex 3 rig that the students got to climb up and down. After a pizza lunch we drove six hours to Ozona, TX in preparation for our tour of BHP and the Permian region.

Friday morning we drove 2.5 hours to the **BHP** facilities located in West Pecos, TX. After an orientation and safety meeting we drove to several of their drilling operations and toured their facilities. The students got their first taste of drilling operations. It was a long day to say the least but was well worth it.



Students relaxing at the Alamo



Group photo in front of a Flex 3 Rig at H&P



## FIELD SESSIONS

### HOUSTON CONTINUED

Saturday morning we drove to San Antonio to give the students a break and spend some time visiting the Alamo and River walk area. Sunday, the students decided to make a run to the beach area in Corpus Christi. We had a nice day playing soccer, football, and having fun in the water relaxing. We headed to Cuero, TX in the late afternoon to prepare for our tour of the Eagle Ford area.

Monday, we visited the **Pioneer Natural Resources'** Pawnee field office. The tour was organized by CSM alum Vance Hazard and his team of specialists. He and his team showed the students production, fracturing, and gas processing facilities. We had a wonderful time talking with Vance and thoroughly enjoyed the stories about Pioneer's operation. We especially liked the story he told and the picture he showed that involved one of the students (Daniel Reeves) when he was a little kid.

Tuesday, we visited **Anadarko's** Brassada Gas Processing facility. We were able to see their central command center, gas compressors, and glycol adsorption units. We were treated to a pizza lunch that was devoured by the students. I think it surprised our hosts how much college students can eat and may have even frightened them a bit to see how fast all that food was gone. That afternoon we headed back to Houston. We stopped at the Kemah boardwalk to enjoy the waterfront area.



Alum, Vance Hazard, with PE Student, Daniel Reeves after giving a tour of Pioneer Gas Processing Facility

On Wednesday morning we visited **Anadarko's** headquarters in the Woodlands. I think everyone was impressed with the company and wanted to start working immediately for them. The students were especially enthralled with the offshore presentation. They sat on the edge of their seats and I've never seen the students so engaged with question after question for their presenter. After the presentation we were given a tour of their building including the roof top garden area, basketball court, and workout gym. Needless to say, this was a highlight of the trip.



Group photo at Anadarko corporate office



## FIELD SESSIONS

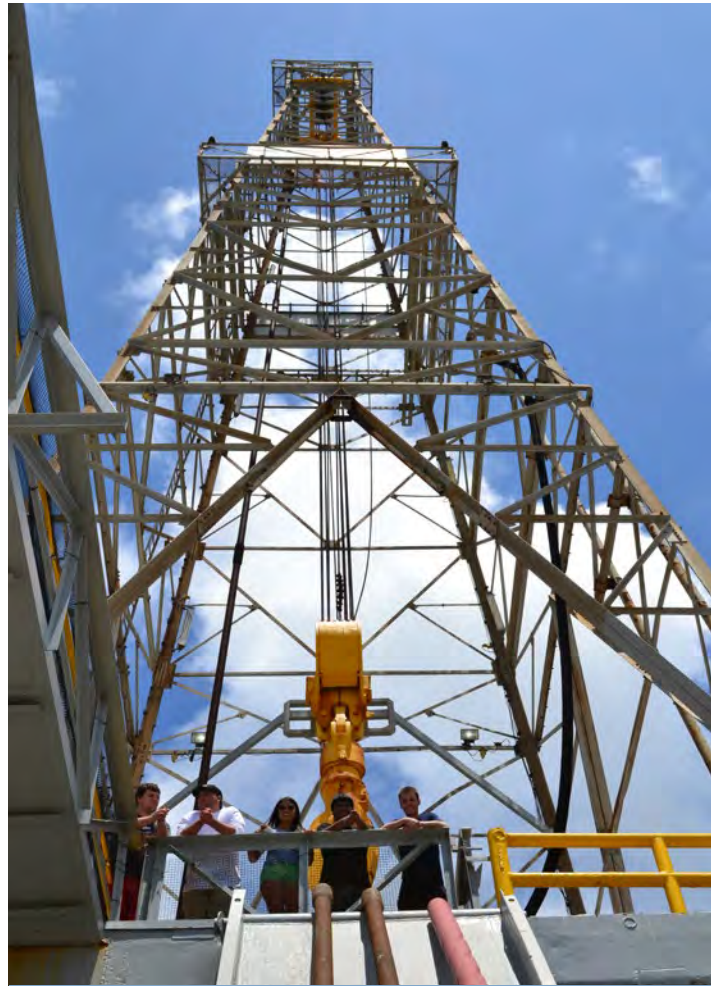
### HOUSTON CONTINUED

The final day, Thursday, was spent at the Ocean Star Offshore Drilling Rig and Museum. The museum had a lot of great exhibits and hands on activities for the students. It just reinforced all the information they learned from the Anadarko offshore presentation.

The Houston/Texas field session wouldn't be possible without the support of all the companies, alumni, and our hosts for making our field session a memorable learning experience for our students. I want to personally thank everyone for taking time out of their busy schedule to support the Colorado School of Mines Petroleum Engineering Department. I hope to see you all in the near future.



PE students in Pioneer's Shape Charges trailer



Ocean Star Offshore Drilling Rig & Museum



Anadarko tour



## PEGN 315 FIELD SESSION – WYOMING By Carrie McClelland

A group of sophomores traveled throughout Wyoming this year to get a hands-on introduction to the industry. The trip began with a visit to the **WPX** corporate offices in Denver and continued with visits to Halliburton in Rock Springs; **QEP**, and **TPG** in Pinedale; and **Anadarko** and Baker Hughes Centrilift in Casper. We were also treated to an amazing geology tour of the Alcova Reservoir area by Terry Logue. With all of these visits, the students received an introduction to oil, natural gas, artificial lift, carbon dioxide injection, hydraulic fracturing, and other aspects of the industry.

We were fortunate enough to be able to have a celebratory dinner with some of our alumni at the Casper Petroleum Club. We are hoping to be able to see many more alumni there next year if we get to do it again. The students loved hearing

your stories and were appreciative of the time you took to attend. Some of the things we did for fun included a quick tour of Yellowstone National Park, exploring Jackson Hole, building a snowman in late May, and having a barbeque at the hotel. (The food was amazing!) It is always a joy to take the students on this excursion and watch as their knowledge of the industry and new friendships grow.



We had some classroom time too...



There was a lot of snow this year!



Tours in the field helped our students see the industry up close and learn a lot.



## FIELD SESSIONS

### WYOMING CONTINUED



Enjoying the scenery, the wildlife, and the weather (which was much nicer this year) in Grand Teton and Yellowstone National Parks



Seeing the area geology...



Dinner at the Casper Petroleum Club



### PEGN 316 Field Session II - MASSADONA By Mark Miller

News Flash: When it is to their benefit, students read faculty email. A late snow storm caused poor mountain driving conditions for this year's first session. For safety reasons, Dean Graves and Department Head Fleckenstein decided to delay field session by a day. An email was sent to students informing of the delay. If it had been an email in the middle of the semester, talking about an assignment, innumerable excuses would have been given as to why they didn't get or read the email. Miraculously, not one student showed up early. It was probably a good thing. By the time they arrived the wind had died down and the snow around the cabins had melted or blown away. Because the faculty and TA's arrived early, the students also lucked out as we did a lot of the camp setup that they would have done. The weather warmed up very quickly after the rough start. In fact, while the first session rafting trip is frequently cold and sometimes miserably cold, this year it turned out to be warmer than the second and third sessions.

Yes, I did say third session. Miners inhabited Massadona for six weeks this year. Like last year, Mansur Ermila helped me with the first session. He also helped Todd Hoffman with the second session. Luis Zerpa and I finished with final session.

We had industry supported geology help again this year, John Detring and Nick Nelson. We thank Microseismic Inc and Samson Resources, respectively, for allowing their much appreciated week long participation. Three of the TAs, Talgat Kosset, Kenny Rennick, and geologist Mitch Weller were out there for six weeks. Rounding out this year's TA participation are Blakley Farrow, Evan Jones, Darkhan Maulimgazy, Chris McCullagh, Bryan McDowell, David Thul, and Jianqiao Wang.



Dr. Ermila taking some notes



## FIELD SESSIONS

### MASSADONA CONTINUED



Wellbore simulator: Check. Tape measure: Check. Last Geology Assignment: Check.

We are also grateful to **Chevron** and **Production Logging Services** for arranging presentations for the three sessions (week, after week, after week). Because of some personnel movement, much of the **Chevron** presentations were handled by two people, Roy Cramer and Rick Moran. They did a great job of tying together what we had previously seen at the outcrop. Rick had some interesting new slides of Mancos shale surface fracture indications. These indications were used to help select the first well locations in the Rangely area. Craig and Kevin Stratton once again, no twice, no thrice, gave the students a production logging primer. Like **Chevron**, **Production Logging Services** provided the students lunch. If you happen to be in Vernal, Utah, you need to ask where **PLS** got the excellent lasagna.

Another interesting place in Vernal, besides the excellent Utah Field House Museum, is the I Love Drilling store. Every year students visit to get hats, bumper stickers, and tee shirts. They take pictures, lots of pictures. They post them in the hallway and on their social sites. This year I had a student ask me when the "official" visit to the store was. Because of this exposure, the student thought I brought the entire class to see them. While, I haven't yet, the associated juice bar earned national news exposure for their two tiered price system. Liberals pay more (\$5.95), than conservatives (\$4.95) for their excellent smoothies.



PE students gathering natural fracture orientations



2014 Section A



## FIELD SESSIONS

### MASSADONA CONTINUED

This year's students earned some big thanks for actually trying to prepare the cabins before painting them. As can be seen in the accompanying photo, globbing on cheap paint without preparation doesn't help much. In spite of being painted within the past few years, the cabins needed a lot of help. Note to department technicians and anyone buying paint: the UV inhibitors in exterior paint probably do something.



While it wasn't a lot, there was briefly snow on the ground.



Getting ready for the annual rafting trip



I love geology.



Group photo before taking on the rapids



2014 Section C





**Department of Petroleum Engineering**

Colorado School of Mines

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Golden, CO 80401



**Another successful year with 172 Petroleum Engineering students graduating in the 2013-2014 school year.**