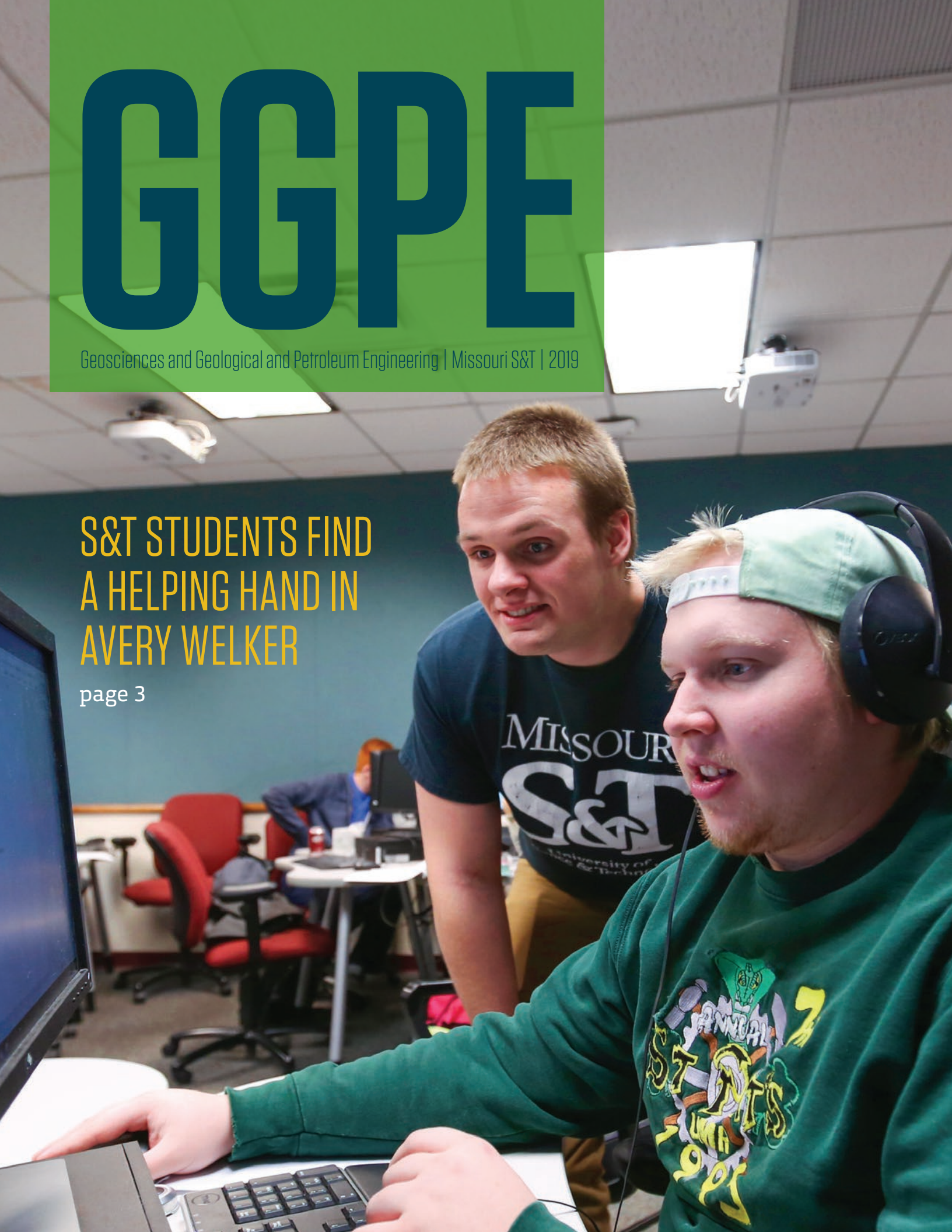


GGPE

Geosciences and Geological and Petroleum Engineering | Missouri S&T | 2019

S&T STUDENTS FIND A HELPING HAND IN AVERY WELKER

page 3



TRANSFORMING LEARNING

INTO INDUSTRY EXPERTISE

The fine-grained sedimentary rock of shale formations can be a rich source of both petroleum and natural gas. Therefore understanding shale characteristics — things like mineral and organic content, porosity, permeability and mechanical properties — is essential.

We are in the process of renovating lab spaces to create a comprehensive Earth Materials Characterization Laboratory that will focus on shales and the petroleum industry, but will also handle mechanical, physical and chemical investigations of all types of rock and soil. By working in this environment, our students gain valuable real-world knowledge that will prepare them for a variety of careers.

Your annual support of the geosciences and geological and petroleum engineering department makes a difference in so many ways — contributing to the learning that takes place in labs like the Earth Materials Characterization Laboratory is one of them.

So when you get a phone call from a student eager to share what's happening on campus and in our department, we hope you'll take time to connect and catch up.

And we hope you'll help us map the future for tomorrow's leaders by giving back.

[GIVE.MST.EDU](https://give.mst.edu)

DEAR ALUMNI, COLLEAGUES AND FRIENDS

Welcome to the 2019 GGPE newsletter. You will see in this installment that our students, faculty and alumni are shining very brightly, and I'm extremely proud of their accomplishments. I have really enjoyed getting to know more of our alumni through recent events in Houston and San Antonio this year. Next year (2020) is the 100th anniversary of our petroleum engineering program. We are planning many events, including alumni receptions in a handful of cities. I look forward to meeting many more alumni along the way. Our students had a successful second annual student research colloquium in April 2019. It was a great event that allowed them to showcase their research and network with many of our alumni and friends who attended the event. I am also excited to report that we developed a new degree option for our students called the accelerated BS-MS degree. This program will allow our best undergraduate students to finish a streamlined MS degree in less time. We already have students enrolled in this new and valuable opportunity. We also have a few faculty and staff changes to report. Dr. Norbert Maerz and Dr. Neil Anderson will be retiring at the end of the summer and will become professors emeritus. Dr. Jeremy Maurer will be joining



us as an assistant professor in the spring after finishing a postdoc with NASA's Jet Propulsion Laboratory (look for a profile piece in the next newsletter). We also recently hired Ms. Janessa Buchely as an administrative assistant. She plays a key role in enhancing our websites and social media presence. I hope you enjoy reading about our accomplishments in this year's newsletter. Be sure to stay in touch with us at rocks@mst.edu and tell us about your recent achievements!

Sincerely,

David Borrok, Ph.D.
Gulf Oil Foundation Professor and chair,
geosciences and geological and
petroleum engineering

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Help us celebrate 100 years of petroleum engineering at Missouri S&T
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Over 2 billion years ago, something happened to create enough oxygen in our atmosphere to support life. Geologist Marek Locmelis believes he has found the trigger.
- 5 Second annual student research colloquium**
Alumni and friends from industry came to S&T to help judge entries in our second student research colloquium.
- 6 Groundwater mapping, managed flooding may help stop sinking**
Parts of California's most productive farmland sunk 28 feet over 50 years. Managed flooding above its aquifers could keep the land from sinking more.
- 7 Alumni briefs**
GGPE graduates from all over are doing great things. Here are just a few of their stories.



S&T's Petrobowl team competed at the North America SPE Student Chapters Regional Competition at the University of Houston. The Petrobowl competition is a rapid quiz-style competition that covers oil and gas industry information and knowledge about geology and basic engineering skills. This is the second consecutive year that S&T's team has advanced to the ATCE international competition, which will be held in Calgary Sept. 30-Oct. 2. Team members include petroleum engineering seniors **Grant August, Charles Smith, David Lian**, petroleum engineering graduate student **Weicheng Zhang** and **Alex Pfeifer**, PetE'19. **Steven Hilgedick** is the faculty advisor.

1000



YEARS OF

PETROLEUM ENGINEERING

Producing leaders in the oil and gas industry

In 1920, Missouri S&T (then called the Missouri School of Mines) began a petroleum engineering program within its highly respected mining engineering department. Our program was the fifth petroleum engineering program in the U.S. The first four programs were the University of Pittsburgh, established in 1912; the University of California, Berkeley, established in 1915; West Virginia University, established in 1916; and Stanford University, established in 1919.

In 2020-21 we will celebrate 100 years of petroleum engineering at S&T. During that same time, Missouri S&T will celebrate the 150th anniversary of the university's founding. Petroleum engineering is proud to be part of S&T's 150-year legacy. We already have several events planned, and we hope you'll come celebrate with us.

Over the next two years, we will host road-show-style alumni events in key oil and gas cities to talk about the exciting things going on in our department and celebrate our history. If we visit your area, we hope you'll plan to attend.

We plan to invite key alumni from the oil and gas industry to participate in a campus lecture series, to talk about their lives, their history and their work. You will have a chance to nominate yourself or other alumni to celebrate our legacy in Rolla.

We also plan to establish a petroleum industry hall of fame to honor notable alumni from the oil and gas industry who have made significant contributions to their profession. Please nominate alumni — both deceased and living — to be recognized here.

We have also formulated several centennial fundraising targets as we complete our first hundred years and set the stage for our second century. Our primary centennial fundraising goal is to create a world-class Earth Materials Characterization Lab, with cutting-edge imaging and rock characterization capability. Other centennial fundraising goals include updating our other labs and equipment.

More information, including ways to submit nominations and details of centennial fundraising needs, will be posted on petroleum.mst.edu as plans are finalized. For more information, contact us at rocks@mst.edu.



IN-KIND SEISMIC DATA GIVE IS LARGEST IN S&T HISTORY

This past fall, our department received an in-kind donation of proprietary seismic data valued at \$6.5 million from Calico Jack Holdings LLC and Zion Energy LLC, both Houston-based oil and gas exploration companies. This is the largest gift Missouri S&T has received in its history.

The data is a 3-D geologic and seismic survey of 85 square miles along the Texas Gulf Coast.

"We hope this proprietary data set will assist students in multifaceted ways," said **Stephen Zeboski**, GGph'81, founder of Calico Jack Holdings LLC. "Geoscience students can use this data as a learning tool for interpretation and mapping. Petroleum engineering students can use the data for reservoir analysis to assist in prospect generation. I truly valued the time I spent at Rolla, and I am thankful for the events in my career that brought me to this point. Understanding that it started with my education, I have always felt a desire to give back."

The data is used in Exploration and Development Seismology, Introduction to Geophysical Data Analysis, Seismic Stratigraphy, and Seismic Data Processing, among other classes.

Mr. Zeboski passed away in May. The geosciences and geological and petroleum engineering department expresses deepest sympathy to Mr. Zeboski's family. He will be missed.



S&T students find a HELPING HAND IN AVERY WELKER

It isn't difficult to spot **Avery Welker** in a crowd. And the 6-foot-4-inch-tall S&T graduate student's broad smile and relaxed manner make it easy for him to make connections.

"I find it fun to talk and learn something new about a person," says Welker, PetE'16, MS PetE'18, pictured above with **Anna Ramirez**, PetE'19, and secretary of Students Today, Alumni Tomorrow.

That genuine interest in other people — especially students — led him to apply to be the student representative to the University of Missouri Board of Curators. Missouri Gov. Mike Parson appointed Welker to the board in July 2018. He was sworn in at the board's September meeting at the University of Missouri-Kansas City. His term runs through Jan. 1, 2020.

During his days as an undergraduate student and resident advisor, Welker focused on helping his fellow S&T students succeed. Now, as student representative to the UM Board of Curators, Welker is in a position to help even more students find success.

"The role I would like to fill is being a solid point that any student, at any campus, can come to and ask for help," he says. "Having been at Missouri S&T for a long time, I would know what direction to point a student in regardless of what campus they are on."

The most enjoyable part of the role for Welker so far has been learning about the support he has within the UM System leadership.

"Meeting a lot of new people and finding out just how much the system leadership truly cares about me and wants to help me succeed was incredibly encouraging," says Welker. "It has been really humbling to have so many important people that drive the university, take time out of their days to help me, give me advice and teach me about their departments."

"The role I would like to fill is being a solid point that any student, at any campus, can come to and ask for help."

Welker says he initially chose Missouri S&T because it offered a quality education in his discipline at an affordable price.

"Being eligible for in-state tuition and [Missouri S&T] having the program I wanted was a huge reason I decided on pursuing my bachelor's degree here," says Welker. "Once I was on campus, it grew into so much more than a good investment. The quality of education that I've been given in my program is one of the best parts of S&T"



The beginning of

LIFE AS WE KNOW IT

Geology and geophysics assistant professor **Marek Locmelis** believes he's found a possible trigger for the Great Oxidation Event. The event, which occurred approximately 2.4 billion years ago, dramatically increased the oxygen content in Earth's atmosphere, paving the way for the rise of all lifeforms that use oxygen to break down nutrients for energy.

"Without the Great Oxidation Event, there would be no plant and animal life on Earth or at least no life on Earth as we know it — including us," says Locmelis.

He used a technique known as laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) analysis to compare the trace element chemistry of olivine from igneous rocks called komatiites that are 3.5 billion to 3.3 billion years old to ones that formed more recently — about 2.7 billion years ago. This technique enables much more sensitive analysis of solid samples than earlier methods.

"Because they're so old, and they came from deep in the Earth, they allow us a unique window into what the interior of our planet looked like more than 2.7 billion years ago," says Locmelis.

The study focused on redox-sensitive element ratios, which can be used to investigate redox conditions of magmas. Increased oxygen levels — an oxidizing atmosphere — may have enabled the evolution of aerobic respiration, allowing today's plant and animal life to evolve and thrive.

Based on trace element ratios captured by olivine, it appears that Earth's mantle gradually became more oxidized between 3.5 and 2.7 billion years ago. This oxidation, in turn, possibly triggered the Great Oxidation Event.

Previous studies dismissed the Archean Eon mantle oxidation, but they used different analytical techniques. Researchers used to crush and analyze whole rocks instead of isolating and analyzing minerals, such as olivine, using modern techniques.

"Take eating a sandwich. You take a bite and just want to taste a pickle, but sometimes the pickle is so small that you're overwhelmed by all the other flavors," says Locmelis. "That's the difference between whole rock studies and mineral studies. When you analyze minerals directly, you circumvent all the problems associated with bulk analysis, which really, are just a mix of different flavors or geological processes."

Locmelis' study suggests that Archean mantle oxidation may have contributed to, or even triggered, the oxidation of Earth's atmosphere. A recent study by Robert Nicklas from the University of Maryland submitted at the same time yielded similar results using a different analytical approach.

"If two studies come to the same conclusion, independently and with different techniques, it suggests that we are really onto something, and that we have to rethink our understanding of the redox evolution of our planet," says Locmelis.

"Without the Great Oxidation Event, there would be no plant and animal life on Earth or at least no life on Earth as we know it — including us."

FACULTY AND STAFF ACHIEVEMENTS

The Society of Petroleum Engineers (SPE) named **Baojun Bai**, the Lester R. Birbeck Endowed Professor, as the 2019 recipient of the SPE Distinguished Membership.

Ralph Flori, associate professor of petroleum engineering and assistant chair for undergraduate studies, was one of three CEC faculty named CEC Dean's Educators.

In December, the Outstanding Teaching Award was presented to **Stephen Gao**, Curators' Distinguished Teaching Professor; **Kelly Liu**, professor; **J. David Rogers**, the Karl F. Hasselmann Missouri Chair in Geological Engineering; and **Wan Yang**, associate professor. The award is based on student evaluations of teaching effectiveness.

Sharon Lauck, GGPE administrative assistant for graduate degree programs, won the 2019 Graduate Staff Excellence Award.

Marek Locmelis, GGPE assistant professor, received the Junior Faculty Award during the Academy of Mines and Metallurgy banquet in April.

Patty Robertson, longtime administrative assistant in GGPE, received the CEC Loyalty Award.

Mingzhen Wei, associate professor of petroleum engineering, was named the 2018 College of Engineering and Computing (CEC) Dean's Scholar in recognition of work that uses machine learning, neural networks, and artificial intelligence to address the challenges of her discipline.



2nd annual

STUDENT RESEARCH COLLOQUIUM

The second annual GGPE Student Research Colloquium was held on campus in April.

The research colloquium was established to give our students an opportunity for networking and professional development and to bring our alumni back to campus to meet with students and faculty. This year's winners are:

Ph.D. category

First place — **Sherif Fakhher** — Investigating the Factors Impacting Carbon Dioxide Adsorption to Shale Rocks

Second place — **Mohammed Alkhamis** — Development of Ultra-High-Performance Epoxy Resin-Based Sealant for Wellbore Integrity Applications

Third place — **Edward Duarte** — Modern Facies Distribution and Sedimentation Processes in a Pull-Apart Basin: Exploring an Active Example from Lake Izabal Basin, Guatemala

Master's category

First place — **Qiaoqi Sun** — Strain Partitioning Across the Polochic-Motagua Fault System, Guatemala: Insights from Kinematic Numerical Modeling

Undergraduate category

First place — **David Lian** — Examination of the Relationship between Rate of Penetration and Mud Weight Based on Unconfined Compressive Strength of the Rock

Second place — **Abdullah Alshammari** — Insights into Mechanical and Differential Pipe Sticking with Cases History from Sindbad Field, Iraq.

Thirteen industry professionals traveled to S&T to judge the competition. Thanks to our judges:

George Carlstrom, GeoE'75

Paul Conrad, GeoE'83

Jeffrey Crews, GGph'04

Brian Gilmore,

CerE'97, PhD CerE'01

Jana Hochard, PE'18, Econ'18

Kevin Lahay, GeoE'78

Joe Lori

Lisa (Arnold) Lori,

MS GGph'16

Gary Pendergrass

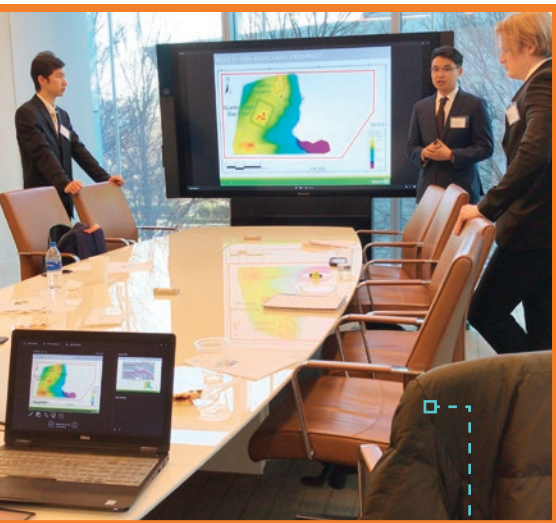
Tom Schott

Cherie Telker, MS GGph'13

Brian Tepper, GeoE'80

Keith Wedge, GGph'70,

MS GGph'71, PhD GGph'73



INTERNATIONAL BARREL AWARD PROGRAM

Five GGPE graduate students competed in the American Association of Petroleum Geologists Imperial Barrel Award program during its 2019 Mid-Continent Section Regionals held at Devon Energy in Oklahoma City.

The IBA program is an annual prospective basin evaluation competition for geoscience graduate students from universities around the world.

Teams analyze a dataset with geology, geophysics, land, production infrastructure and other relevant materials in the eight weeks prior to their local competition. Then, each team delivers their results in a 25-minute presentation to a panel of industry experts.

Student team members were **Yanwei Zhang**, **Enjuan Jiang**, **Trey Anglim**, **Chen Zhao** and **Edward Duarte**.

Jonathan Obrist-Farner, assistant professor of geology and geophysics, was the faculty advisor, and **Brian Tepper**, GeoE'80, a retired petrophysicist from Shell Oil Co., served as the team's industry advisor.

GROUNDWATER MAPPING, MANAGED FLOODING MAY HELP STOP SINKING

Parts of California's Central Valley, the state's most productive farm region, sunk as much as 28 feet during the first half of the 20th century, and if modeling is accurate, the ground will sink another 13 feet or more over the next 20 years.

Ryan Smith, an assistant professor of geological engineering at S&T, working with colleagues at Stanford University, developed the model. It could help water managers map precisely where groundwater recharge is most needed to replenish aquifers in the area.

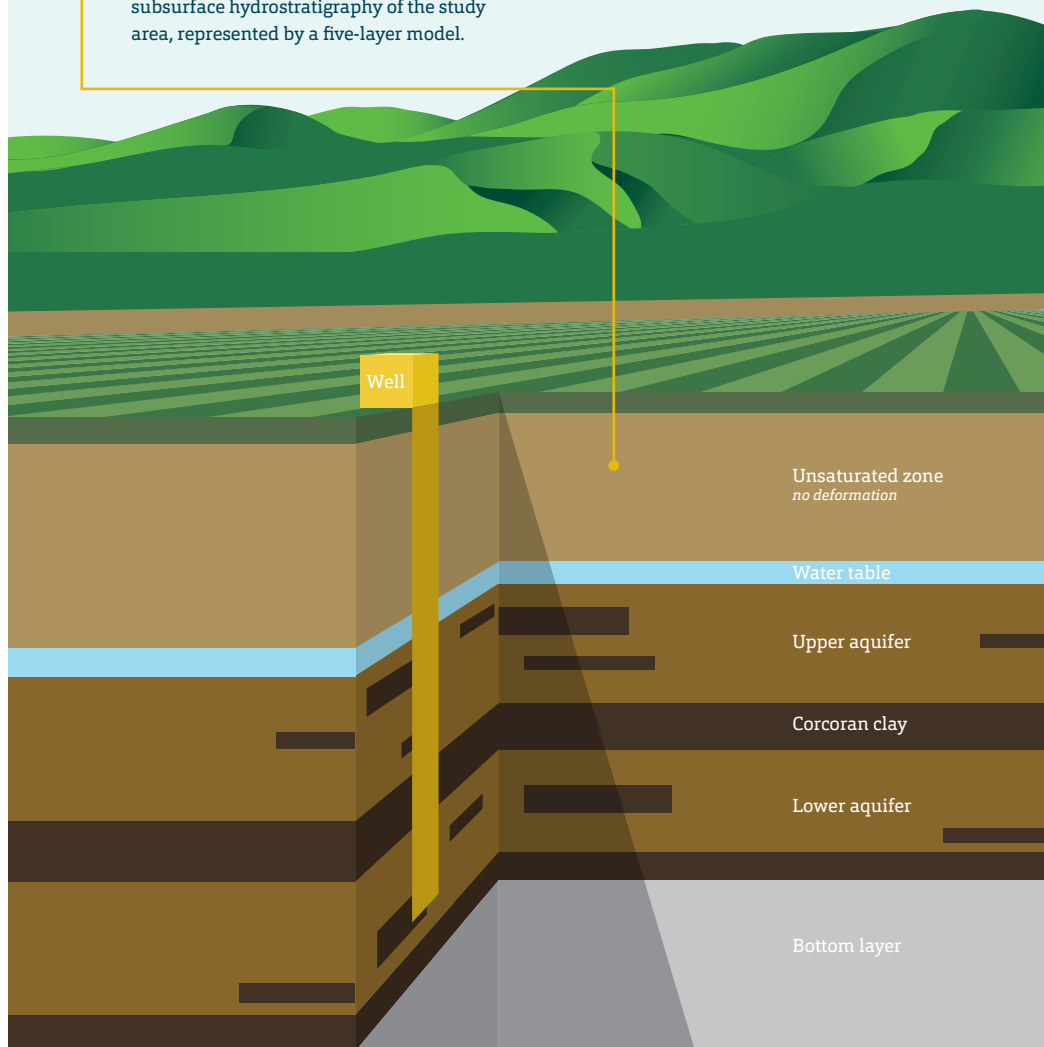
The research, which was published in the journal *Water Resources Research*, suggests managed flooding of the ground above the aquifers.

Smith says the amount of water exiting the Central Valley's aquifers far surpasses the amount of water trickling back in. That overdraft has caused land across much of the region to sink, permanently depleting groundwater storage capacity and damaging infrastructure.

Knowing where water will go underground depends on mapping the intricate channels of sand and gravel that interlace tightly packed clays and silts. In California, that information often comes from drilling contractors' reports to state regulators, which are expensive to acquire and do not cover areas between or beneath the drilled wells. As a result, the most common approach to dealing with subsidence, the downward settling or sinking of the ground's surface, is reactive, Smith says.

"If we are proactively managing, then we can prevent unrecoverable storage loss," says Smith, who completed the research as a Ph.D. student in geophysics at Stanford.

Conceptual model showing the subsurface hydrostratigraphy of the study area, represented by a five-layer model.



ALUMNI BRIEFS

Thank you to our alumni who returned to S&T to give guest lectures. They include **Mike Party**, GGph'78, owner and president of Beryl Oil and Gas in Midland, Texas, and AAPG president; and **Brian Tepper**, GeoE'80, a retired petrophysicist from Shell Oil Co.

Dan Bailey, GeoE'03, MS EMgt'05, director of engineering projects for Lee Mathews, one of nine partner companies that operate under Cogent, was named to Kansas City business magazine *Ingram's* list of 40 Under 40 for 2018. Bailey, a member of the S&T Order of the Golden Shillelagh and vice president of the Miner Alumni Association board of directors, recently assisted in equipping the newly constructed Advanced Construction and Materials Laboratory at Missouri S&T.

Brian Bradley, PetE'86, joined the Miner Alumni Association board of directors as a director-at-large.

Stephanie Kline-Tissi, GeoE'09, joined Jett Environmental Consulting in March 2018. The company specializes in groundwater statistical analysis and environmental compliance consulting for solid waste management facilities.

William Patterson, PetE'53, published his second memoir, *I Can See Back*. It features St. Pat's stories, including one involving three different young ladies elected to the court of the Queen of Love and Beauty.

Drew Shontz, GeoE'14, was named vice president of ECS Chantilly.

William Tedesco, GGph'97, of Magnolia, Texas, received the Alumni Achievement Award during Homecoming 2018. The award recognizes outstanding personal achievements by alumni in the fields of academia, business, professions or civic endeavors.

Mark Warner, GeoE'85, was named partner for Equis Group in Singapore.

Sarah Wiszkon, GE'00, was selected for the National Council of Examiners for Engineering and Surveying Civil Exam Committee, Geotechnical Subcommittee. Wiszkon was chosen as the Illinois Department of Transportation Materials representative on the Value Engineering Study for the I-270 Mississippi River Bridge.



Pictured above, David Borrok speaks at the dedication of the official scenic historic marker noting V.H. McNutt's 1925 discovery of potash.

V.H. MCNUTT HONORED IN NEW MEXICO

On March 16, **David Borrok**, GGph'95, GGPE chair and professor, was invited to speak at the dedication of an official scenic historic marker honoring **V.H. McNutt's** discovery of potash in Carlsbad, N.M.

Borrok was invited on behalf of Missouri S&T and the GGPE department to speak about McNutt, MinE 1910, MS MinE 1912, his history with our university and the endowment that V.H. McNutt's wife, **Amy Shelton McNutt** bestowed to the geology department.

"In this 21st century, every S&T graduate of the geology and geophysics program has been asked an exam question about the potash industry of New Mexico in honor of V.H. McNutt," Borrok says.

He spoke of how meaningful the endowment has been in supporting geology students through scholarships. He also shared the significance the endowment held for him, personally.

"I got into geology because I was offered a McNutt scholarship," he says.

Joining in the dedication were representatives from the Bureau of Land Management, RESPEC, the mayor of Carlsbad, the New Mexico Historical Society, the New Mexico Bureau of Mines, and the New Mexico Department of Transportation.



WELCOME BACK TO MISSOURI S&T

This past fall, **Rickey Hendrix**, MS GeoE'04, MS PetE'06, PhD PetE'13, returned to his alma mater as associate teaching professor of drilling engineering.

Hendrix's research focuses on the performance of drilling operations, drilling efficiency and optimization, drilling safety and drilling automation.

Hendrix, who had served as a lecturer in GGPE since 2016, is a faculty advisor for Drillbotics.



PALISCH NAMED SPEI DISTINGUISHED MEMBER

Terry Palisch, PetE'86, global engineering advisor at CARBO Ceramics, received the Society of Petroleum Engineers International Distinguished Service Award and was named Distinguished Member of SPEI.

Palisch began his career with ARCO Alaska, where he worked reservoir, completions, operations and new ventures engineering at the Kuparuk River Field. He later transferred to ARCO International as a senior engineering advisor at the Rhourde El Baguel Field in Algeria where he supervised the fracture stimulation program at ARCO's Kuparuk River Field and advised the local Algerian engineering staff on completions and operations activities. In 2004 Palisch joined CARBO Ceramics. He advises clients and his company on completion/fracture optimization, and assists in new product development.

He has authored over 40 SPE technical papers, is past chairman and board member of the SPE Dallas Section and is currently the Completions Technical Director on the SPEI board of directors. He received the 2012 SPE MidCon Region Completions Optimization and Technology Award and was named 2015 SPE Dallas Section Engineer of the Year.

STUDENT UPDATES

During the Academy of Mines and Metallurgy banquet in April, scholarship awards were presented to **Joel Broddon**, a senior in geological engineering from Chesterfield, Mo.; **David Lian**, a senior in petroleum engineering from Springfield, Mo.; and **Aaron Wilson**, a senior in geology and geophysics from Farmington, Mo.

Peyton Shaw, a senior in geological engineering from Wright City, Mo., represented Alpha Chi Sigma as a Student Knight of St. Patrick during the 111th St. Pat's celebration in March.

EL-BAZ HONORED FOR ETHICS

Farouk El-Baz, MS GGph'61, PhD GGph'64, received the 2018 Inamori Ethics Prize from the Inamori International Center for Ethics and Excellence at Case Western Reserve University in September. The award is presented annually to honor outstanding international ethical leaders whose actions and influence have greatly improved the condition of humankind.

El-Baz has played a role in six Apollo missions, including the first lunar landing of *Apollo 11*, assisting in landing site selection for each mission. He also created and directs the Center for Remote Sensing at Boston University, which uses space technology to study the earth and its environment, including finding critically needed groundwater in arid regions around the globe. Based on the analysis of space photographs, El-Baz's recommendations resulted in the discovery of groundwater resources in Egypt, India, China, Sudan, the Sultanate of Oman, United Arab Emirates and Chad.

A HEAD START FOR OIL AND GAS INDUSTRY CAREERS

S&T students looking for careers in the oil and gas industry got a leg up this past spring, thanks to Edinburgh engineering firm Petroleum Experts, known as Petex.

Petex granted Missouri S&T a license to use the petroleum engineering company's Integrated Production Modeling (IPM) suite — the latest petroleum engineering software tools. The software, designed to improve the efficiency of oil and gas fields, has a commercial value of \$2,424,414.

"We're grateful for Petex's continued support of our petroleum engineering program," says **Shari Dunn-Norman**, associate professor of petroleum engineering at Missouri S&T. "This license will ensure that our students have access to the latest and most sophisticated software available for the study of production engineering, reservoir engineering and the geosciences. The software will also be used by our graduate students for research."

The Petex software allows for the modeling of full oil and gas production systems by capturing the physics, geology, engineering and fluid thermodynamics of the system from reservoir to oil and gas wells to the surface pipeline system and process. Once built, these models are used to optimize production for existing oil and gas fields and to assist with the system design of new fields.

The Petex software is used by approximately 150 petroleum engineering students at Missouri S&T, as well as geology and geophysics students. They have access to the full Integrated Production Modeling suite, which consists of PVTP, MBAL, REVEAL, PROSPER, GAP and RESOLVE.

WELCOME TO THE ACADEMY

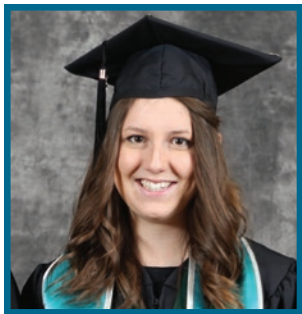
Molly Laegeler, PetE'00, of Midland, Texas, Midland Basin Area manager for Chevron, was inducted into the Academy of Mines and Metallurgy in April.

She began her career as a reservoir engineer at ExxonMobil working offshore oil fields in Nigeria and Equatorial New Guinea. In 2005, she joined Chevron as a new field development engineer in the Southern Africa business unit. She continued her career with Chevron, working fields in Angola and Congo, and deepwater projects in the Gulf of Mexico before moving to Indonesia.

After serving as planning manager and Duri asset optimization manager in Indonesia, Laegeler moved to Midland, Texas, as Midland Basin Area manager. She is a member of the Missouri S&T Computing and Engineering Advisory Board, and the Society of Petroleum Engineers.

PETROLEUM GRADUATES ADDRESS DECEMBER GRADS

Two petroleum engineering graduates were among the graduating seniors chosen to speak during December 2018 commencement ceremonies.



Alyssa Snider, PetE'18, compared life to a building designed by an S&T engineer, that needs supports to remain standing. She defined her supports as her family, her peers who encouraged her to take on leadership roles and fun weekends free from assignments, projects and tests.

"Wherever your journey takes you, I encourage you to find your own set of supports," Snider said. "Keep your family close (even as a real adult you can still call Mom), make connections with co-workers who will encourage you to move up, and lastly ... find yourself a place to relax at on the weekends."



Ethar Alkamil, MS PetE'18, spoke of the impact of an individual person on friends and the community, referring to this as the length of our shadow. Alkamil said the length of the shadow has little to do with height or appearance, but depends on hard work, character, kindness and respect for others.

"As I've walked through Missouri S&T every day for the past five years, I've seen passion, creativity, and greatness," Alkamil said. "I've been inspired by fellow students, faculty, and staff—each with a drive to make the world better. My time here has given me even more power to pursue the infinite possibilities I have dreamed of."



SUELLENTROP ENCOURAGES LIFELONG LEARNING

Stephen G. Suellentrop, PetE'74, MS PetE'75, chairman of Hunt Oil Co. and Hunt Refining Co. encouraged graduates at December's commencement ceremonies to never stop learning and to immerse themselves in their career passions.

"Continue to deepen your craft, become more of an expert, continue to learn and gain expertise in subjects outside your chosen discipline and broaden yourselves," Suellentrop said. "This pursuit of learning in the fullness of time will bring you a much more informed perspective of your role in the various phases of your career."

During the ceremony, Suellentrop was awarded the doctor of engineering, honoris causa.

"All of you have received the finest university education possible," he said. "Trust me. This is the truth."

GAO RECEIVES CURATORS' HONORS



Stephen S. Gao, professor of geology and geophysics, was named Curators' Distinguished Teaching Professor of geology and geophysics during December's commencement ceremonies.

The Curators' Teaching Professorship was established at Missouri S&T in 1990 to honor outstanding professors, call attention to teaching excellence, and foster improvements

in teaching and learning.

Gao has been awarded over 30 externally funded projects supported by the National Science Foundation, the American Chemical Society and other agencies to support field work in Africa and Asia, as well as throughout the United States. His research expertise includes imaging the Earth's deep interior, distributions of earthquakes and geophysical detection of buried objects.

Gao joined S&T in 2006. Since 2016, he has served as a senior investigator in the Rock Mechanics and Explosives Research Center. He has published over 90 refereed articles in journals including *Nature* and *Science*, and over 240 conference abstracts and proceedings and technical reports. At S&T, he has graduated 12 Ph.D. and 10 master's students as the major advisor.

A fellow of the Geological Society of America, Gao has received numerous awards for excellence in teaching and research, and was awarded the Governor's Award for Excellence in Teaching in 2018.



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TOUGH

Tell us how you're doing. We'd love to hear about new appointments, degrees earned, job promotions and other family or professional news.

Get in touch by emailing rocks@mst.edu. Tell us what you're doing with your degree so we can feature your accomplishments among our alumni achievement stories. And if you're ever in Rolla, stop by and visit. We'd love to see you.



Miguel Cedeno,
PhD PetE '19