



# The School of Geosciences Newsletter

## Greetings from the new Director



Welcome to the 2019 School of Geoscience Newsletter! I am the new Director of the School of Geosciences. I joined the University of Louisiana at Lafayette in August 2018 and would like to highlight some of our main accomplishments since last year. My mission is to serve the School of Geosciences and advance the interests of the University of Louisiana at Lafayette, along a path graciously paved by Dr. David Borrok (Chair 2012-2017), Dr. Carl Richter (Interim Chair 2017-2018) and before them by Dr. Brian Lock (Chair 1991-2003).

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Some would have said that it was impossible, yet our Raging Cajun geologists won the International Imperial Barrel Award for the third time. The five winners of this 2018 award did a great honor to their teachers, to the School of Geosciences, and the University community. Our esteemed colleague, Dr. Jenneke Visser, retired in December 2018 and we hope that she will stay in

touch with us as an Emeritus Professor. She was recently honored by the Graduate Council to be the Grand Marshal for the Fall 2018 commencement ceremony. We are currently conducting two searches for assistant professors in the areas of soil science and coastal wetland ecology. Needless to say, we have exciting times ahead of us with a significant rejuvenation of our faculty. In the area of sedimentology, we welcome our young and vibrant colleague, Dr. Davide Oppo who is already building a strong research laboratory.

Expanding and maintaining our instrumental scientific capabilities will be a major strategic instrument of our growth. Our ICP-OES is currently being repaired thanks to funds provided by the Dean of the College of Sciences, Dr. Azmy Ackleh, and will soon resume producing high quality data under the expert hand of Dr. Yingfeng Xu, our research technician. The rock cutting aficionados will be delighted to learn that we have acquired two new saws thanks to Dean of Engineering, Dr. Mark Zappi. This Spring semester, Hamilton Hall is becoming the Louisiana premier paleomagnetic laboratory with the installation of a cryogenic rock magnetometer and dynamic shielding room.

One of the most exciting news is the launch of our new Earth and Energy Science (EESC) doctoral program, in partnership with our colleagues from Physics and Chemistry. The strong pool of applicants is really encouraging as our faculty continues to attract external funding to support their research. The international span of the School of Geosciences continues to grow with new initiatives such as the Study Abroad internship in Nepal that will be offered in the Summer 2019 by Dr. Durga Poudel. In this regard, the assistance of the Office for Global Engagement, led by Dr. Gabriel Carranza has been invaluable.

I would like to conclude on a personal note: after spending my formative years in France (1980-1989), the next ten years in Africa, Nigeria and South Africa (1990-2000), and sixteen years in Illinois (2002-2018), I call Lafayette, Louisiana home. The people in the School of Geoscience, students, staff and faculty, in the university and Lafayette community make me feel welcome. I am truly humbled by the kindness that has been extended to me and I want to give back. I am dedicated to relentlessly advancing our School, and to promoting our students, researchers and colleagues. There is a strong current of positive energy flowing in Hamilton Hall and I believe that each one of you is part of it. I look forward to our next successes and thank you immensely for your support.

Sincerely,  
**Eric Ferré**

## Faculty and Instructor Updates

### Katie Costigan

2018 was my biggest professional and personal year yet! My Research Experience for Undergraduates program had its first cohort of 10 students who worked with faculty affiliated with the Institute for Coastal and Water Research. I had two NSF proposals funded ten days apart! Our Macrosystem grant was one of four full research awards that this section of NSF awarded in 2018. I am very much looking forward to the new, interesting things that we learn about rivers that dry. My

MS student, Taylor Dorn, graduated in the Spring and is at ULCA working on a PhD in planetary science. I currently have four students who are hoping to graduate this spring or summer.

Personally, my husband and I welcomed home our first baby, Oliver Thomas (after his dad and my dad), in November. He is a joy, and he is learning new things every day.

### Aubrey Hillman

It was a busy but productive and enjoyable year in 2018. I graduated my first Master's student, Roxanna Vaught-Mijares, and took on three new students who I am excited to work with. Fieldwork continued to occupy the majority of my summer and despite the challenges of working in remote places, it's my favorite part of the year. This past year I made it to Imphal, India and Cajamarca, Peru and returned home with plenty of mud to keep several students occupied. My NSF project in China continued forward and we made great progress on

characterizing contaminated sediment sources to lakes and understanding how lake level changes mobilize this contamination. I continue to poke holes in any and every lake I can here in Louisiana and we are starting to get preliminary results regarding the environmental history of Lake Martin, so keep your eyes peeled for a publication soon! Outside of school, my husband and I continue to garden extensively and tend to our chickens (thanks to Jim Foret!) and in 2018 I completed the Boston Marathon despite terrible weather.

### Tim Duex

After last year I got a few comments about retirement and all I can say is that I'm still working (on my classroom credentials that is). So, in case you didn't see this last year, I'm still here and actively involved with students. Basically the same courses as before, although no more field camp this summer because that is being handled capably by Raphael, Kristie, and others. I think I'll miss it, but instead I'll be heading back to Nepal, doing a field course there with Durga (Poudel) and concentrating on environmental issues in that fascinating country. And there are plenty of things to look at: in one of our previous studies we found that in a small watershed about 85% of the springs had diminished flow or had dried up completely in the last couple decades.

There are also many environmental and hydrology issues to deal with in Louisiana and now I have a group of

students who are doing research on the Chicot Aquifer confining layer. Several other students finished theses on hydrologic studies with the help of Steve Sinitiere, who is now with the DEQ in Lafayette, and like me..., well you've probably figured it out by now. As I also mentioned I'm interested in "hardrock" studies and now (after only 35 years) I have a grad student interested in economic and mining geology, not in this area but still interesting. And I'm still teaching, in case you hadn't heard.

Again, as some may remember, I used to be a runner, but now I get tired just trying to jog my memory, which is fading but, um, let's see, I think I was going to tell you something... Oh well, hope all is well with all of you. Stop by some time when I'm not busy and we can reminisce.

## Jennifer Hargrave

The past year was one of the busiest I've had and it seemed to fly by. Most of my efforts were spent teaching. In all, I taught over 700 students in 6 different courses and received favorable reviews and positive feedback in all of them. I continue to modify the classes and I try to offer active learning strategies, even in my classes of 200 students!

I am supervising three graduate students with thesis topics pertaining to fossil field sites in Oregon. Two of them are on track to graduate this summer. I am a committee member for five more, which I enjoy, as I get to learn and be a part of a variety of projects.

My work at the UL Geology Museum continues. I coauthored a paper on one of our Oregon sites and had some time to begin work on personal research, including a nearly complete fossil bird skeleton. I am hopeful to gain more time for personal research to publish some of the incredible fossils housed in our museum. We are creating two new exhibits. The first highlights fossil whales from Louisiana and is now open. The second is a larger exhibit, focusing on Earth as a system and should

open later this fall. Be sure to read more about the whale exhibit in this newsletter.

This past summer, I worked with Drs. Duex and Kinsland to offer a 6-day "geology boot camp" for area high school students that was sponsored by a grant from Halliburton. We introduced them to geology and career opportunities in the geosciences. It was a successful week and we look forward to offering the camp again.

Some of my favorite times from the past year was spent engaging the community with visits to local schools, meeting with a Boy Scouts troop, and even showing off some fossils at Downtown Alive. In all, I met with over 400 community students! Not a bad way to spend my time.

Finally, my husband Reko and I welcomed a daughter to our family over the summer. We are all quite smitten, including her big brother, who adores her. Although I am certain she will also be a geologist, her current interest in rocks seems limited to eating them!



Dr. Kinsland demonstrating how to use the Proton Precession Magnetometer to the students from the Halliburton Geology High School Summer Scholars Program.



Baby Hargrave performing a grain size analysis at her brother's baseball game.

## Raphaël Gottardi

It seems that I can't stay away from beautiful west Texas! After characterizing the natural fracture system of the Eagle Ford Formation with graduate student Shanna Mason ([see results published here](#)), graduate student Victoria Chevrot is now using these outcrops of the Eagle Ford Formation as an analog to develop a methodology for sweet spot analysis. Meanwhile, Ross Ledoux is studying the fracture system of the underlying Buda Formation, and its relationship to regional structures in this part of Texas. Ross and I got to spend a couple of days in the field over winter break and took the opportunity to visit the nearby Seminole Canyon State Park and its marvelous petroglyphs.

In collaboration with Dr. Mokhtari and the Tuscaloosa Marine Shale Laboratory (Petroleum Engineering Department), and our new Assistant Professor of Petroleum Geology, Dr. Oppo, we have started a comprehensive analysis of the Tuscaloosa Marine Shale from various donated cores, that include sedimentary petrology, sequence stratigraphy, and depositional environment (Katie Fearn), and geochemical stratigraphy

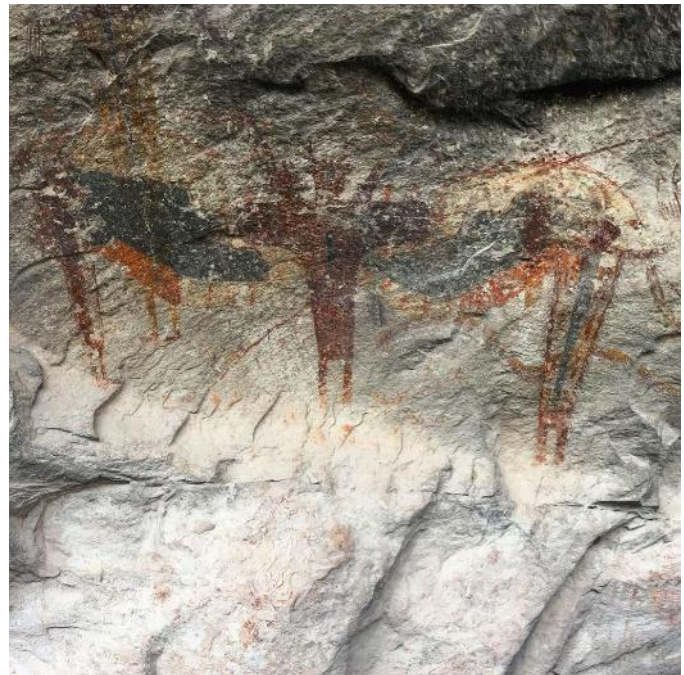
(Grace Stone and Jack Simmons). Our research is already filling some critical gap in our understanding of the Tuscaloosa Marine Shale.

Last year I negotiated the donation of 53 cores from the Smackover Formation of southern Alabama, and naturally, it spurred a few student theses! With precious help from Dr. Lock, we are investigating facies distribution, porosity development, and paleo-environment of this prolific carbonate reservoir. Geophysical data over the play are scarce, and if any of you have any seismic data to share please contact me! It would greatly help our understanding of the play.

I manage to continue my research on continental tectonics, and I am very proud of finally publishing the work of two former grad students, Mike Berklund and Max Schaper ([link](#)). Additional work by Kohl Koppens, Sam Yun, and Megan Borel on various metamorphic core complex of southern Arizona is constraining post-orogenic collapse processes in this part of the Cordillera, and additional geochronological work is ongoing to constrain timing of events.



Ross Ledoux inspecting hybrid shear fractures in the Buda Formation near Langtry (TX)



Petroglyphs at Seminole Canyon State Park (TX)

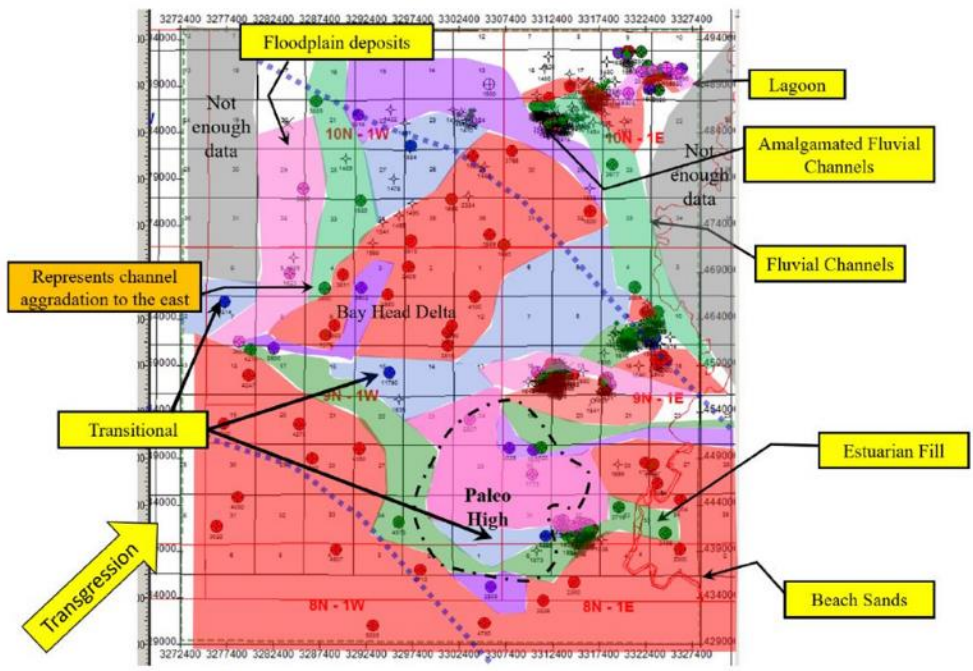
# Gary Kinsland

I just read my part of last year’s newsletter and I realize that this most recent year looks like the year before only busier and more productive. Below I list the names of students who have finished (or nearly finished) within this year under my direction and the titles of their theses. This should give you an impression of projects in which I am involved:

- Eric Muchiri; Spring 2018; Optical Inspections and Scanning Electron Microscopy across the Cretaceous-Paleogene Boundary Deposit in Well-Core IPNH No. 2 from LaSalle Parish, Central Louisiana
- Nathan Quick; Summer 2018; Subsurface Mapping and Seismic Modeling from Resistivity Data to Tie Locally Productive Formations of the Wilcox Group in LaSalle Parish, Louisiana to a High-Resolution Shallow Imaging Seismic Dataset
- Anne Brennan; Fall 2018; Depositional Environment of the Carrizo Sandstone in Central Louisiana, Implications for Future Oil Discoveries
- Nicholas Loundagin; Fall 2018; Geophysical Characterization of the Structural Configuration and Tectonic Evolution along the Northern Margin of the Gulf of Mexico Basin, Northwestern Mississippi
- Kevin Broussard; Fall 2018; Regional Subsurface Investigation of the Uppermost Cretaceous and the James Limestone in the Eastern Region of Texas

- Randall Bennett; Fall 2018; Gravity Investigation of a Normal Fault in Southern St. Landry Parish, Louisiana
- Forrest Frederick; will be Spring 2019; X-ray Diffraction and X-ray Fluorescence Analysis of the Justiss LA Central IPNH No. 2 Well-Core from LaSalle Parish, Central Louisiana
- Tyler Hebert; maybe Spring 2019; Uplift History of the Sabine Uplift in Northern Louisiana and Northeastern Texas

Am I slowing down? Doesn’t look like it and doesn’t feel like it. However, I am trying to narrow down the areas within which I will take on graduate students to studies of: 1) the effects of the Chicxulub Impact, 2) formation of the of the Gulf of Mexico Basin, 3) coal in Louisiana...we completed the reconnaissance study...finishing the “detailed” study using all wells to map the coal basin will complete deep coal studies in Louisiana, 4) structural history...northeastern Texas, northern Louisiana, west central Mississippi and 5) how mantle convection effects eustatic sea level. Some of these I could complete...others, I will never complete. I am not ready to stop yet...I played intramural basketball again this year. Victoria and Mikaila, 18 and 20, are now at UL (chemical engineering and psychology) and Kellie is now a real estate broker. “Time flies when you are having fun.”



Facies map from Anne Brennan’s MS thesis.

# Brian Schubert

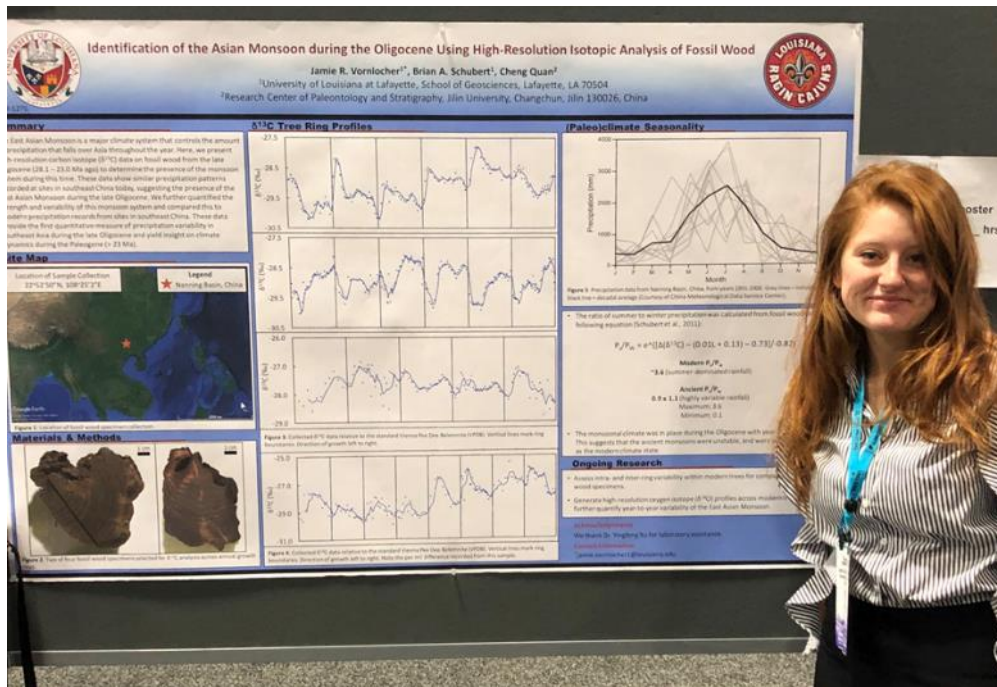
First, I want to congratulate Jamie Vornlocher and Robert Narmour for their Grand Prize wins at the 18th Graduate Student Symposium at the University of Louisiana at Lafayette. Jamie won for her poster titled, “An assessment of monsoon variability under elevated atmospheric carbon dioxide levels”, and Robert won for his talk titled, “Extreme precipitation events recorded in the oxygen isotope composition of tree-ring cellulose.” Jamie also presented her thesis research at the Graduate Student Research and Project Showcase at UL Lafayette and the American Geophysical Union Fall Meeting in Washington, DC.

This year we also welcomed Dr. William Lukens to the lab. Dr. Lukens graduated with his PhD from Baylor University in December 2017 where he studied paleosols from the North American Great Plains and across sites in Kenya, Africa. In his short time here at UL Lafayette, he has greatly advanced the work started by Peace Eze (BS in Geology, 2017) looking at the chemical degradation of organic matter during coalification, and has contributed immensely to the lab group through his substantial sedimentology, geochemistry, and statistical expertise. This coming Fall Dr. Lukens will be starting his own research lab at James Madison University in Virginia as a new Assistant Professor in the Department of Geology

and Environmental Science. We wish him well in this new position!

In addition to my responsibilities as a Coordinator for the Geology MS Program, I now also serve as the Coordinator for the Geology BS Program and an Academic Graduate Coordinator for the new Earth and Energy Sciences PhD Program. We are all quite excited to welcome our first PhD students to the School of Geosciences this Fall, and we have received much interest from alumni of our BS and MS programs. This year, I also had the opportunity to travel to Norway to work with colleagues on a variety of projects, including Paleozoic plant fossils. I had the pleasure of going through vast museum collections containing exquisite fossils collected over 100 years ago by Arctic explorers to the Svalbard archipelago.

Dr. Yingfeng Xu continues to work closely with everyone in the lab to prepare and analyze all of our samples and train new students. The number of collaborators and users of the lab continue to grow, even as her responsibilities within the School of Geosciences have expanded greatly over the last 5 years. Last, my sons Alex and Noah are now 3 and 6 years old – Noah started kindergarten and Alex started pre-school. Some of their favorite activities are building things, baking, and gardening. Best of all – Noah’s current ambitions are to be a paleontologist!



Jamie Vornlocher presents her research at the American Geophysical Union Fall Meeting in Washington, DC.

## Rui Zhang

Dr. Zhang and his research group have made great achievements in 2018. At the beginning of the year, Dr. Zhang and his colleagues were awarded 9.7 million dollars from the Department of Energy to establish the "Tuscaloosa Marine Shale Laboratory", which is the largest award UL Lafayette has ever received.

In October, Dr. Zhang received the Prestige Award for Best Paper in INTERPRETATION 2018 for his paper "*Time-variant wavelet extraction with a local-attribute-based*

*time frequency decomposition for seismic inversion*" co-authored with Dr. Sergey Fomel from the University of Texas at Austin, published in Volume 5, No. 1, February 2017. The award was presented at the SEG Annual meeting in Anaheim CA in October.

At the same conference, Mr. Mark Mlella, a master student working with Dr. Zhang, participated in the SEG/Exxon Mobil Student Education Program in Anaheim CA.



Dr. Zhang receiving the Prestige Award.



SEG/Exxon Mobil Student Education participants.

## Gabriele Morra

2018 was an important transitional year in which I prepared the ground for a series of exciting new results. I was lucky enough to be supported by three brilliant graduate students, Brennan Brunsvik and Brian Dye from geology, and Saurav Gautam from Physics. With Brennan, we developed a technique to calculate the morphology of seismic faults from the hypo-centers of micro-earthquakes only. We applied it to a sequence of seismicity in central Italy for one year and our results are now submitted for review. With Brian Dye, we have devised a new technique to use Machine Learning to detect eruptions during Strombolian activity, using Machine Learning of images captured from a camera fixed on the rim of a volcano (Erebus, in Antarctica). We demonstrated that this method is superior to traditional cross-correlation of seismic time series, given that it can detect small events, invisible from seismic data only. A

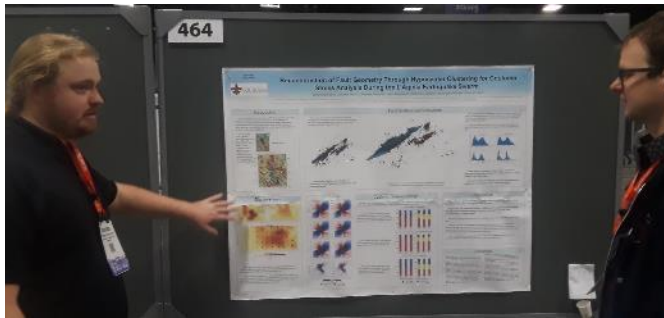
publication is now in review. This strategy will allow future researchers to study different types of eruptions in Strombolian volcanoes.

On a different side, with my student Saurav Gautam, we developed a new numerical technique for modeling non-thermal plasmas. Beyond the intrinsic scientific interest, this work has applications in environmental sciences (e.g. cleaning water) and other fields that are just now emerging. To our knowledge, our model was the first that could reliably detect the electron and ion densities in an experimental setup.

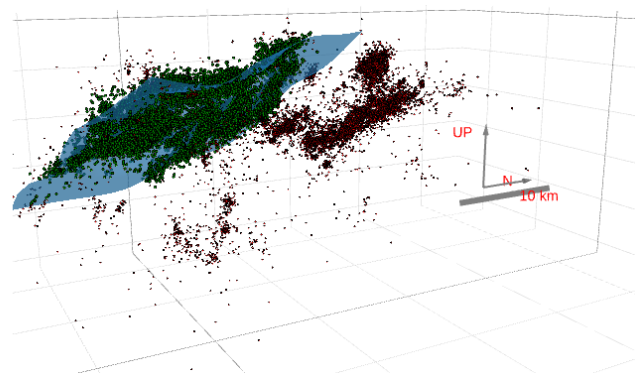
I also made numerous outreach efforts. In 2018 I began to participate at the Board of Regents SoS (Speaking of Science) program, which brought me to talk with 4th and 5th graders about seismology and geodynamics. It has been a fantastic and refreshing experience.

At a more academic level, besides attending a number of workshops and conferences, I have organized a workshop within the large AGU Fall Meeting in Washington titled "Innovating The Geosciences: Data Science, Machine Learning, And Jupyter". It has been a major success. All the available places were taken more than one month before the meeting. A follow up special volume on machine learning and the use of Big Data in Geosciences is coming into shape.

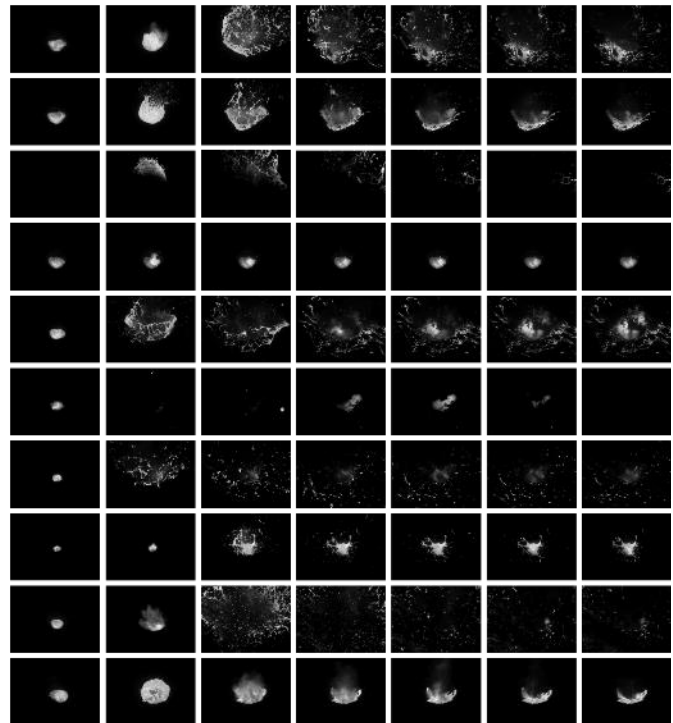
Now that all my students are finishing their work, I will focus my energies on writing first author publications, mainly on new numerical techniques based on the Lattice Boltzmann Method, that can be applied to solve any geophysical fluid-dynamic problem, and on submitting proposals based on the results of the research done in 2018.



Brian Brennan presenting his research at AGU



Interpolated fault surface compared to locations of hypocenters. The images face north-west. Green represents the hypocenters that were part of the cluster of which the mainshock is part. Red shows all other aftershocks.



Ten eruptions, seven images each of an approximately 14 second sequence of Strombolian eruptions detected using the convolutional neural network. The first sequence is of the original master event. The black areas in sequence 3 and 6 are cause by the plume obscuring the line of sight.



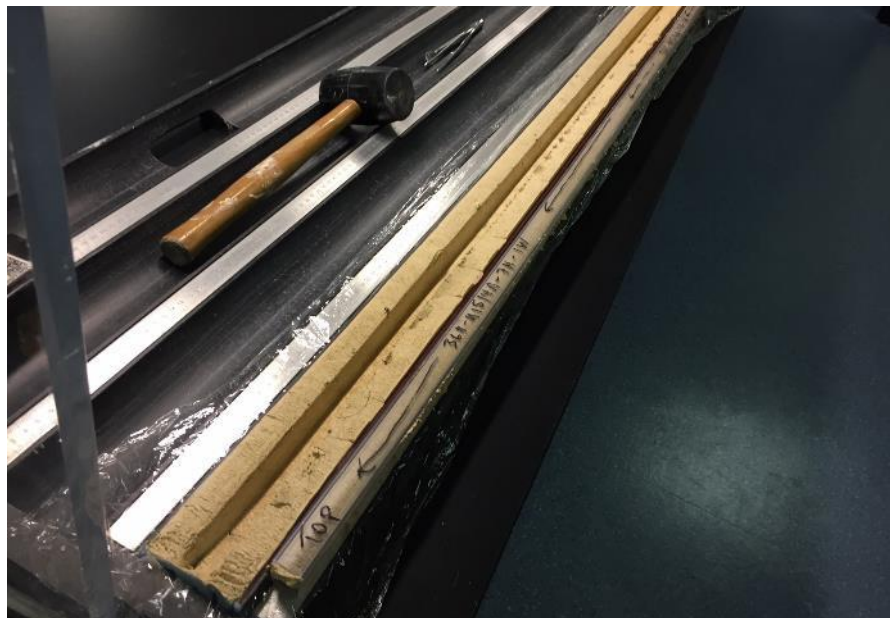
## Carl Richter

Carl Richter started a new research project with graduate student Olawale Ariyibi investigating the magnetic record of cores from International Ocean Discovery Program (IODP) Expedition 369 to the Mentelle Basin and Naturaliste Plateau in the Indian Ocean south of Australia, he was part of in October/November of 2017. He spent a week at the core repository at Texas A&M University to collect about 100 m of continuous core material using u-channels. The samples were shipped to the University of California at Davis, where a specialized long-core magnetometer is available for detailed magnetic analysis in collaboration with Dr. Ken Verosub. The main goals of this investigation are to improve the age model of the sediments with magnetostratigraphy, to extract a record of the magnetic paleointensity going back into the Oligocene, and to use magnetic concentration parameters and granulometry to look into the environmental changes at the Australian margin throughout the Cenozoic. Unfortunately, a collaborative proposal with researchers from the University of Texas at Austin and the University of Nebraska to the National Science Foundation to fund this project was rejected so that the work for now has to proceed with minimal expenses from other funding sources while addressing

the criticisms of the reviewers to hopefully obtain full funding in the next proposal cycle. In the Spring of 2018, graduate student Morgan Canezaro successfully defended her thesis project on the environmental impact of heavy metal pollution using magnetic susceptibility screening and XRF analysis in Baton Rouge, which was started with former student Hannah Vadrines and Bill Schramm from the LDEQ a decade ago. The results of this long-term study were presented at the Fall Meeting of the American Geophysical Union in Washington D.C. and are in the process of being prepared for publication. Carl participated on two oceanographic research expeditions on the R/V Pelican to deploy and collect hydrophones in the Gulf of Mexico near the Deepwater Horizon site in May and November and is currently turning the M.S. thesis work of Lindsey Horton and Oludamilola Adesiyun on IODP Expedition 339 (Mediterranean Outflow) into a publishable article. With the upcoming Ph.D. program in mind, he developed a – still pending – proposal on piloting a Convergence Research Center at the university together with colleagues from physics, biology, and education. Outside the university, Carl is now in his fifth year as president of the Southwest Louisiana Geophysical Society.



Carl in port at Louisiana Universities Marine Consortium (LUMCON) in Cocodrie



U-channel sampling of IODP Site U1514 at the repository at Texas A&M University

## Effects of Global Climate Change on High-Altitude Agriculture, Ecosystem, and Environment Study (GCCHiaAEES) Program

### Durga Poudel

Effects of Global Climate Change on agriculture, ecosystem, and environment are widespread from coastal areas to high elevation regions. Commonly cited climate change impacts in coastal regions include sea level rise, increased ocean water temperatures, inclement weather conditions, frequent incidences of intense rain events and flooding, and prolonged drought conditions. Similarly, high-altitude regions also currently experience multitudes of climate change impacts including rise in temperatures, early snowmelt, incidences of new diseases and pests on crops, erratic rain events, mass wasting, and drying of springs. Depending on the developmental stages of countries and available resources to combat climate change impacts, societies across the latitudes are adapting to climate change impacts in many different ways, often the resource-limited societies embracing adaptation measures in a very limited scale or adopting practices without adequate scientific validation process. In order to develop a comprehensive understanding of Global Climate Change impacts on agriculture, ecosystem, and environment across the latitudes it is critical for students, faculty, and researchers in the discipline of Environmental Science to get field exposure and gain first-hand knowledge in various aspects of climate change including impacts, exposures, and adaptation.

The Environmental Science Program in the School of Geosciences at the University of Louisiana at Lafayette is organizing a Study Abroad Internship program in Summer 2019 in which a group of undergraduate students will spend two weeks in the field in Nepal and become heavily engaged in first-hand and comprehensive understanding of Global Climate Change impacts on high-altitude environment. Nepal's elevation ranges from below 200 m asl to 8,848 m asl at the peak of Mt. Everest. This program will provide an unsurpassed opportunity to our students, who are mostly from Louisiana, in gaining a comprehensive understanding of Global Climate Change issues. This will put them in a very favorable position in their future Global Climate Change mitigation and adaptation pursuits.

Students will examine and document the effects of climate change impacts on agriculture, water resources, wildlife, local communities, forest resources, and other ecological and environmental settings of the region. They will identify various climate change mitigation and adaptation measures implemented and will identify gaps between policy measures and ground realities. Students will complete their group projects, synthesize results, and present to local stakeholders. (For additional information, please contact Professor Durga D. Poudel at 337 482 6163 (office), email [ddpoudel@louisiana.edu](mailto:ddpoudel@louisiana.edu)).



A landscape of Nuwakot district, Nepal (Photo: DD Poudel)

## New Faculty

### Eric Ferré

I consider myself a jack of all trades and master of rock magnetism! I would pretty much work on any scientific project provided it has the word magnetism in it. Let's start with the lab. In rock magnetism and paleomagnetism, we need a lab to perform measurements on natural specimens. I brought with me, in a bright yellow truck, lots of magnetic instruments that are currently being installed on the first floor of Hamilton Hall. A new dynamic shield is also being installed to prevent specimens from acquiring a new magnetization between steps of demagnetization, the fundamental approach of paleomagnetism. In this instrumental development, I have an accomplice and expert colleague, Dr. Carl Richter, with whom we will combine our equipment and skills. My current research is largely focused on the geological record of seismic deformation. When a large magnitude earthquake occurs, friction along slip surfaces causes a dramatic increase in temperature that commonly leads to frictional melting. The rocks resulting from this process are called pseudotachylytes. For example, I am conducting research on pseudotachylytes from the 2008 Wenchuan earthquake area in China. This research is part of an ongoing collaboration with scientists from the Chinese Academy of Geological Sciences in Beijing. I am hosting

two Chinese colleagues, Dr. Dongliang Liu and Dr. Caicai Liu, both working on this type of deformation. I am also working on ultramafic pseudotachylytes formed in mantle rocks in Italy and Corsica with Eli Hosseinzadehsabeti, one of my PhD students. The last part of my frictional melting research theme focuses on pseudotachylytes produced by large-scale / giant landslides. Our samples originate from Utah and Nepal and hopefully I will be able to collect some from Austria in the Summer 2019. I also have an interest in the oceanic lithosphere and ophiolites. The main scientific questions that I pursue in this area pertain to the thermal boundary layer, between the sheeted dike complex and gabbros, primarily based on rocks from Cyprus and the Eastern Anatolian ophiolites. My most recent IODP ocean drilling expedition in 2017, in the South Sea of China, opened yet a new direction of investigations focusing on non-magmatic continental extended margins. Interestingly, last August 2018, I mounted a scientific-speleological expedition to a 700 m-deep pothole in the French Pyrenees to investigate the contact between a series of carbonates and a large mantle peridotite body exhumed along a normal fault in a passive margin setting in the Pyrenees. It's always fun to get to the bottom of things!



Pseudotachylyte from Utah



Eric Ferré (right) and colleagues caving in the Pyrenees

## Davide Oppo



Fall 2018 was my first semester at UL Lafayette after moving from the UK, and my new adventure as Assistant Professor of Sedimentology and Petroleum Geology already has started full steam. Most of my time has been dedicated to preparing the courses and to planning the future research activities. I took

over the Sedimentary Petrology course that used to be Dr. Lock's before his retirement. I maintained its excellent format and added a personal touch that, among other aspects, includes a final group work presented by students in a talk.

Research-wise, I started an intense communication exchange with the US-based research and industry community to build-up a network of collaborators. My research on hydrocarbon migration and cold seepage continues with the work of MS students Joseph Chapman and Zachary Lukaszski by interpreting seismic data in the offshore of Australia. I am working on the expansion of the School's software resources by mediating the donation of Longbow by TGS, and by updating the Petrel

license together with the inclusion of a new plug-in eXchroma by Schlumberger.

During the fall I worked to convert Hamilton Hall 109 from a teaching room to the new sedimentology laboratory, which currently hosts extensive bench and samples storage surfaces, and a new meeting area with a high-end projector. HH 109 will be the main working area of the Sedimentary Basins Research Group (<https://risingfluids.com/>), which I decided to create to offer a unifying identity for all the students and interested faculty that are working on projects related with sedimentology. I am working with Dr. Gottardi to create an industry-sponsored Petroleum Geology consortium, which aims to tighten the relationship between the School and Industry by providing direct access to research work and students training.

In the fall, I joined graduate student Grace Stone and my colleague Dr. Gottardi at the GSA conference in Indianapolis to present recent work on the geochemical characterization of a core recovered by a well through the Tuscaloosa Marine Shale in Louisiana. During Spring 2019 I will have the pleasure to present the stratigraphy of the same core at the AAPG ACE in San Antonio, TX with graduate student Mary Fearn.

# Geology Museum Update on Exhibits and Collections Dr. Jim E. Martin

At the University of Louisiana Geology Museum, 2018 could be considered the year of the whales. In our continuing efforts to rotate displays in the Museum galleries, we spent the year casting two fossil whales. Two of the best known fossil whales worldwide were originally discovered in Louisiana from the Eocene Yazoo Formation and were subsequently found across the

southern Gulf States. The project was a cooperative venture among the UL Geology Museum, Dinolab from Salt Lake City, and the Lafayette Science Museum. With help from staff, students, and particularly, volunteers, we spent the year producing and mounting replicas of two toothed whales, *Basilosaurus* and *Zygorhiza*.



*Basilosaurus* (left) and *Zygorhiza* (right) mounted in the University of Louisiana Geology Museum housed within the Lafayette Science Museum.

The whale crew: Back, left to right, Jim Martin, Chris Madsen from Dinolab, Susie Hughes, Aleta McBane, Michael McBane, Cathy Bishop, Brian Quebedeaux; front, Gage Seaux, and Mary Landry.

*Basilosaurus*, a 55-foot whale, was originally described in 1834 by Richard Harlan, who thought the long vertebrae and sharp, pointed teeth belonged to a reptile. Therefore, he named the creature *Basilosaurus*, which means "king lizard." Richard Owen, the famous English anatomist and paleontologist, examined Harlan's specimens and found numerous features that indicated the skeleton was that of an early whale rather than a reptile. Although the name is a misnomer, the rules of scientific priority dictate use of the original designation. *Basilosaurus* was one of the largest creatures to live for the first 50 million years of the Age of Mammals. Skeletons range from 49 to 59 feet, with a 4 to 5-foot long skull armed with sharp, jagged teeth. The skeleton

is long, narrow, and relatively eel-like with front paddles and greatly reduced rear paddles. The backbone is composed of 70 vertebrae. Unlike most living whales, *Basilosaurus* moved principally by muscular contractions along the vertebral column in an even vertical wave-like movement somewhat similar to that of living eels, although most movement would be in a vertical plane. Some researchers believe limited movement in a horizontal plane was possible. Flukes were present but were probably much reduced compared to those of modern whales. Therefore, the buoyancy, limited movement, and relatively small fluke suggest *Basilosaurus* fed principally near the surface and probably did not dive deeply.



Preparing the molds to cast the replica of Basilosaurus; Susie Hughes and Gage Seaux.



Mounting the Basilosaurus skeleton at the Museum; left to right, Chris Madsen, Michael McBane, and Aleta McBane.

**Zygorhiza**, an 18-foot whale that is closely related to but much smaller than Basilosaurus, was named 13 years after Basilosaurus by Reichenbach based on fossil remains discovered near Clarksville, Louisiana. **Zygorhiza** means “yoke root” in reference to the shape of the premolar and molar tooth roots. Both possess a long, narrow rostrum, retracted nasal opening halfway up the rostrum, and ragged, pointed teeth aligned along the jaw margins. These teeth were adapted for securing principally fish, although they were undoubtedly opportunistic and would consume any type of small prey. **Zygorhiza** had a 3-foot long skull, a skeleton much more similar in proportion to that of living whales compared to Basilosaurus. Rather than being elongate, **Zygorhiza** had a much more fusiform body, more typical of living hydrodynamically shaped marine mammals. In addition to the whale project, preparation of the giant fossil camel, *Megatylopus*, from the Miocene of Oregon continued in the laboratory. Preparation and conservation are nearing completion. Next, our plan is to scan the skeleton and 3-D print a replica for a free-standing display in the next couple years. Also, all creatures that were found with the camel have been prepared and catalogued including, minnows, suckers, birds, rabbits, rhinos, and a rare, horned bovid.

In November, the Museum underwent a rigorous inspection by Ms. Emily Palus, Deputy Division Chief of Cultural, Paleontological Resources, and Tribal Consultation, from the Washington, DC, Bureau of Land Management Office, and Dr. H. Gregory McDonald, Regional Paleontologist, Salt Lake City Office. The result delivered orally to Dr. Eric Ferré was outstanding, but we await the written evaluation. Obviously, Museum staff, students, and volunteers spent many man-hours in preparing the laboratory and collections for this important inspection.

Finally, additional time was dedicated to field investigations, research, and travel. An important paper that provides the stratigraphic groundwork for the Oregon Miocene research was published with Dr. Jennifer Hargrave and MS student, Kristin Ball: *Martin, J.E., Hargrave, J.E., and Ball, K.L., 2018, Refinements of the Late Miocene Fort Rock Formation in South-Central Oregon, The McKay Formation in Northern Oregon, and the Timing of the Prosomys Intercontinental Dispersal Event: Proc. SD Acad. Sci., 97:203-217.*

Another paper concerning a mammoth trackway at Fossil Lake, OR, was published with Dr. Gregory Retallack, University of Oregon, and others:

Retallack, G. J., Martin, J.E., Broz, A.P., Breithaupt, B.H., Matthews, N.A., and Walton, D.P., 2018, Late Pleistocene Mammoth Trackway from Fossil Lake, Oregon: *Palaeogeography, Palaeoclimatology, Palaeoecology*, 496:192-204

A third contribution concerns fossil fishes from the Miocene deposits of southwestern Washington was

published with Dr. Gerald Smith from the University of Michigan:

Smith, G.R., Martin, J.E., and Carpenter, N.E., 2018, Fishes of the Mio-Pliocene Western Snake River Plain and Vicinity. IV. Fossil Fishes from the Miocene Ellensburg Formation, South Central Washington: *Mus. Zoology, Univ. Michigan*, 204(4):1-19.



Micheal McBane, Jim Martin, and Cathy Bishop beginning to mount the *Zygorhiza*.



Chris Madsen and Gage Seaux preparing the *Zygorhiza* skeleton for mounting.



Susie Hughes painting the *Zygorhiza* skeleton.

# Triple Crown: University team again strikes gold at global oil competition

It's a three-peat. For the third time, a team of geosciences graduate students from the University of Louisiana at Lafayette was named the world's best at determining where to drill for oil. The team of Lauren Martz, Kohl Koppens, Greg Ferguson, Roxanna Vaught-Mijares and Victoria Chevrot, who are all pursuing master's degrees in geology, placed first in the American Association of Petroleum Geologists' Imperial Barrel Award competition.

The contest included 168 teams representing colleges and universities from around the world. The global finals were held in conjunction with the AAPG Annual Convention and Exhibition in May in Salt Lake City. San Diego State University finished second, while Pennsylvania State University came in third.

UL Lafayette has fielded a team every year since the Imperial Barrel contest's inception in 2007. It finished first in 2012, and its 2014 first-place finish made it the only team to repeat as champions, a record that stands. This year's third championship doesn't place the team in exclusive company, said Dr. Carl Richter. It's more like a private club.

"This team has achieved a level of preeminence that's not likely to be equaled anytime soon. It reflects the

quality of students the School of Geosciences attracts and the strength of our graduate program," Richter said.

The team's faculty adviser is Dr. Raphael Gottardi, an assistant professor of geology.

The first-place finish comes with a \$20,000 award. The funds will be used for scholarships, equipment and software for future teams.

The AAPG's Imperial Barrel Award Program requires students to determine the viability of a prospective oil reservoir. The University's team was assigned Bight Basin in southern Australia. Over eight weeks, they analyzed datasets that included information on the basin's geology, land, geophysics and infrastructure. The team reported its verdict during a 25-minute presentation to industry experts, who selected a winner based on technical quality, clarity and the presentation's originality.

UL Lafayette's team advanced to the international competition after taking first place in the Gulf Coast section competition in March in The Woodlands, Texas. Other regional competitors included teams from the University of New Orleans, which placed second, and the University of Texas at Austin, UT San Antonio, University of Houston, and Stephen F. Austin State, Tulane, Auburn and Rice universities.



The 2018 UL Lafayette IBA team: Lauren Martz, Greg Ferguson, Victoria Chevrot, Kohl Koppens, Roxanna Vaught-Mijares



# 2018 in Pictures



Our IBA team winning the world competition for the 3<sup>rd</sup> time



Our graduate students at the 2018 AAPG student expo



Grace Stone and Jamie Vornlocher at our recruiting booth at the GSA annual meeting in Indianapolis



Teri Lewis presenting her undergraduate research at LGS



Sam Ajala, Mark Mlella, and Victoria Chevrot at the LGS fall bbq.



Christian Spano, John Hardin, and Conner Spano learn about geology and wine of France during the 2018 GCAGS convention



Ross Ledoux investigating the fracture system of the Buda Formation, Val Verde Country (TX)

## Student Honors and Awards Geology

**Bill Paine/LGS Endowment Scholarship**

*Daniel Richard, Abigail Breaux  
Brennan Brunsvik*

**Bill & Heather Finely Non-Endowed  
Geosciences Scholarship**

*Olawale Ariyibi*

**Eberhart E. Leschin Scholarship**

*Joseph Chapman*

**Paul M. Toce Scholarship**

*Kristen Holmes, Daniel Richard  
Stephanie Garcia, Kentrell Johnson*

**Joe Battle/LGS Memorial Geology Scholarship**

*Brennan Brunsvik*

**Marvin & Hazel Harvey Morris Endowed  
Geology Scholarship**

*Brennan Brunsvik*

**Chevron Gulf Oil Foundation Endowed Geology  
Scholarship**

*Stephanie Garcia*

**Halliburton Geosciences Scholarship**

*Abigail Breaux, Allison Scates  
Victoria Chevrot*

**Joe Battle/LGS Endowed Scholarship**

*Brennan Brunsvik*

**Fieldcamp Scholarship**

*Allison Scates*

**Nolan Badeaux Scholarship**

*Alexandra Trahan*

**Hugh Allen Bernard Memorial Geology  
Scholarship**

*Gabrielle Billeaud*

**Tim Dore Geology Scholarship**  
*Dawson Richard, Gabrielle Billeaud*

**Walter James Rudick Endowed Scholarship in  
Earth Sciences**

*Joseph Chapman*

## Student Honors and Awards Environmental Science

**Dr. Jorge Gonzales-Dean Joel Fletcher Memorial**

*Victor Bowler*

**Tommy Sanders**

*Haley Vincent, Philip Vanbergen*

**Charles Joseph Miller & Vivian Melancon Miller  
Scholarship**

*Meagan Froeba, Jacob Jarreau, Meg Rinaudo,  
George Bailey*

**South Louisiana Mid-Winter Fair Scholarship**

*Aubrey Mann, Hunter Meche, Agueda "Elena"  
Bragg, Jenee Dansdill, Morganne Guidry*

**Mary Sandoz Brown Scholarship**

*Teri Lewis*

**Overton Cade Scholarship**

*Aubrey Mann*

**Louisiana Garden Club/The Kevin Russo  
Scholarship**

*Teri Lewis*

**Dr. S.L. Solymosy & Mrs. G.A. Solymosy  
Scholarship**

*Austin Latiolais, Brenae Bergeron,  
Gianna St. Julien, Austin Gray,  
Dylan Landry, Benjamin Priola*

**Farmers Merchants Bank & Trust Co. Scholarship**

*Yancey Wade*

**Charles and Julia Walker Bourque Scholarship**

*Hali Corwin*

**FM Bank**

*Yancey Wade*

**J.C. Higginbotham Scholarship**

*Ashton Roy*

**Bob Lafleur / Luke Soileau Memorial Scholarship**

*William Faulk, Grace Rentrop, Corey Fontenot  
Victoria Gomez, Lauryn Lee, Brendan  
McClelland*

## A trip down memory lane...



Brian Lock leading a field trip to Carlsbad Cavern and Guadalupe National Park, March 1998.

# Degrees Granted in 2018

## Spring 2018

### **Bachelor of Science in Geology**

*Mandi Lalonde, Kaleb McClain, Josie Roberts, Alexander Hays*

### **Bachelor of Science in Environmental Sciences**

*Julian Buetow, Jacob Suire, Morganne Guidry  
Payton Matherne, Meg Rinaudo*

### **Master of Science in Geology**

*Carson Allen, Megan Borel, Morgan Canezaro, Taylor Dorn  
Brian Dye, Gregory Ferguson, Edward Gaiennie, Sean Jeansen  
Kohl Koppens, Daniel Locci Lopez, Lauren Martz, Roxanna Vaught-Mijares  
Sydne Workman, Cameron Clark, Parker Leglue, Samuel Yun*

\*\*\*\*\*

## Summer 2018

### **Bachelor of Science in Geology**

*Mattea Tingle*

### **Bachelor of Science in Environmental Sciences**

*Robert Bordelon*

### **Master of Science in Geology**

*Nathan Quick, Eric Muchiri*

\*\*\*\*\*

## Fall 2018

### **Bachelor of Science in Geology**

*Oliver Larroque, Ryan Reames, Jose Silva Flores*

### **Bachelor of Science in Environmental Sciences**

*Erin Barksdale, Nicholas Bent, Jenee Dansdill, Rene Guilbeau, Mandy Johnston  
Philip Vanbergen, Haley Vincent, Miro Vukojevic, Evan Wollerson*

### **Master of Science in Geology**

*Randall Bennett, Kevin Broussard, Madison Miller, Kareem Attia  
Hunter Berry, Anne Brennan, Zachary Ghalayini, Nicholas Loundagin, James Pasley*

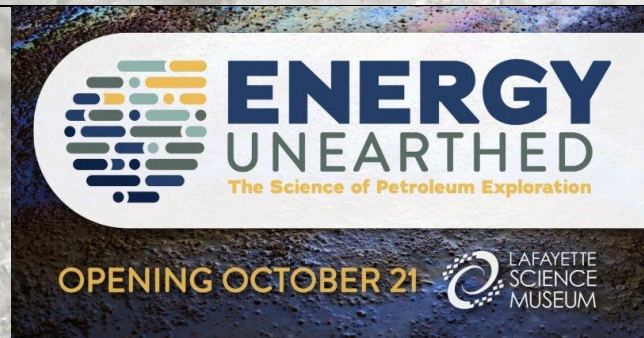
## Upcoming Events

### Gulf Coast Association of Geological Societies



Meet us at the 2019 Annual Convention of the Gulf Coast Association of Geological Societies hosted from October 23-25 by the Houston Geological Society.

### UL Geology Museum



Come to the museum! The Geology museum has moved to downtown Lafayette, to 3000 square feet of space within the Lafayette Science Museum.

**Energy Unearthed:** This new exhibit opened to the public on October 21<sup>st</sup>, 2017. The Lafayette Science Museum is located at 433 Jefferson Street, Lafayette, Louisiana in the heart of Downtown. Call 337-291-5544 for more info.

### AAPG 2019 Annual Convention and Exhibition



Meet us at the Alumni Reception!  
(see info next page)

### Geological Society of America Annual Meeting





UNIVERSITY *of*  
**LOUISIANA**  
L A F A Y E T T E<sup>®</sup>



You are invited to an evening of networking with UL Lafayette alumni and faculty  
at the 2019 AAPG Conference & Expo.

## *UL Lafayette Alumni Reception*



**Monday, May 20**  
5:30 - 7:30 PM

**Henry B. Gonzalez Convention Center**  
900 East Market Street  
O'Gorman Terrace  
San Antonio, TX 78205

Kindly respond below by May 13

**RSVP**



## How to support Geology or Environmental Science

Donations can be made online using the UL foundation website; however, it is quite a challenge to figure out how to donate directly to Geology or Environmental Science using their site. Instead, we recommend making a check out to the UL foundation with instructions for directing the money to a specific area or fund in the notes section of the check. Mail the check directly to the School of Geosciences and we can hand deliver it to the foundation to ensure it gets to the right place. Please contact us if you have further questions ([geology@louisiana.edu](mailto:geology@louisiana.edu)).

We encourage **Geology** donors to use one of the funds described below. Please contact UL Geology directly if you have a question or if you require special arrangements.

1. **The UL Lafayette Geology Faculty & Student Development Fund (#21654)**. This is a non-endowed fund that is designed to support the immediate financial needs of the Geology program. We suggest that donations under \$1000 be directed here.
2. **The UL Geology Student Technology and Research Fund (#7201)**. This is an endowed fund that supports undergraduate and graduate student research activities.
3. **The UL Geology Growth Fund (#21676)**. This is an endowed account that is designed to grow over time to support the long-term needs of the Geology program.
4. We encourage **Environmental Science** donors to use the **UL Lafayette Environmental Science Fund (#05681)**. This is a non-endowed fund that will help to support the immediate needs of the Environmental Sciences program. We hope to develop and open an endowed fund for long-term growth in the future.

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