



# Geosciences

 | Baylor University

GEOSCIENCES  
NEWSLETTER 2022



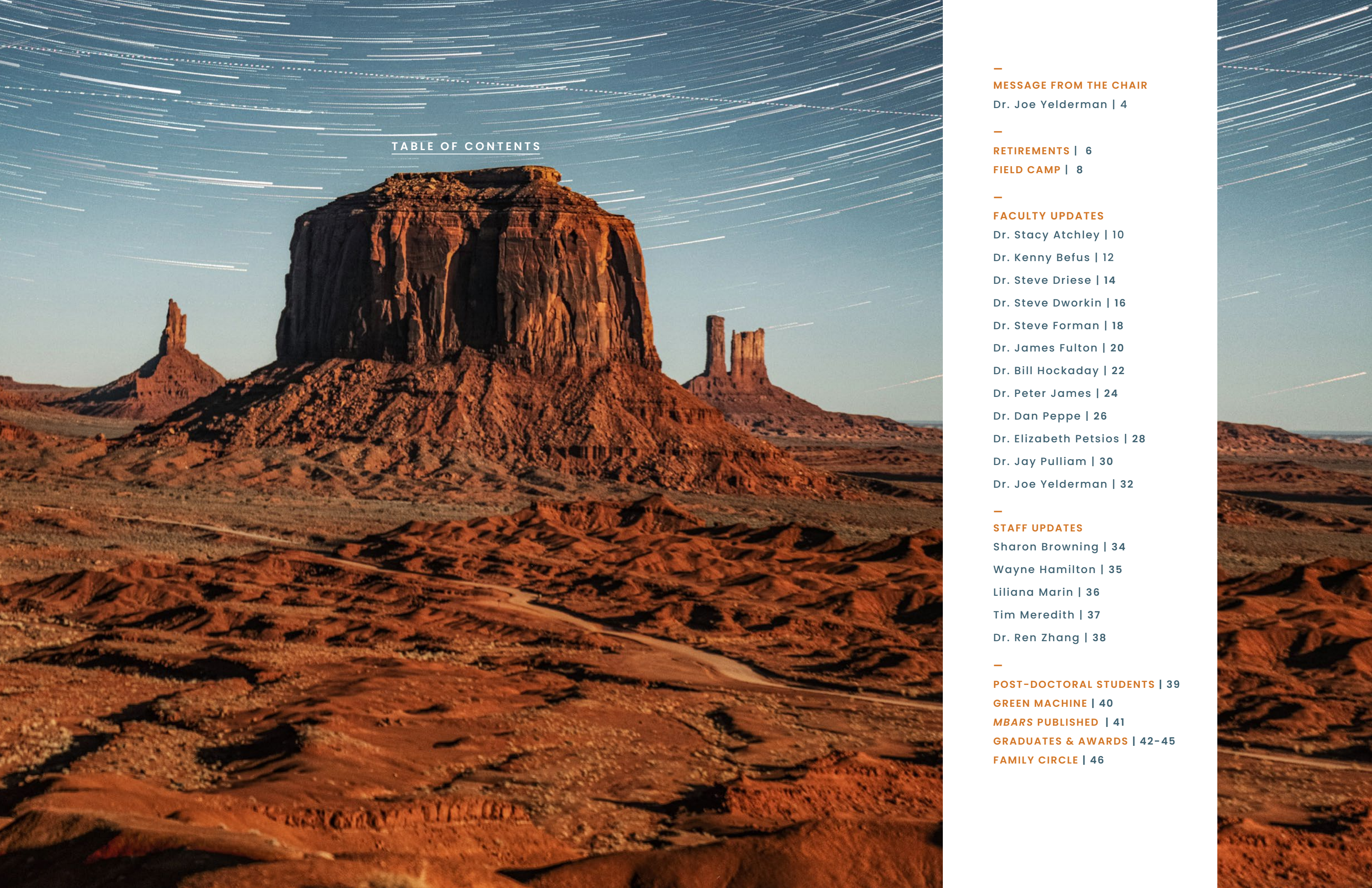


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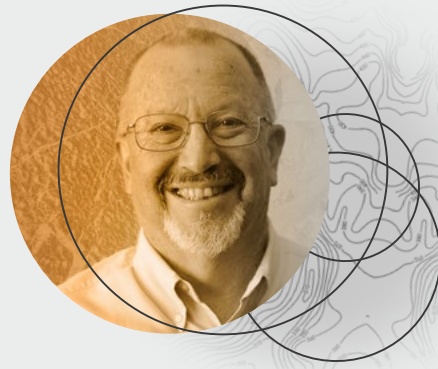
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## CHANGES...

A PERSON CELEBRATING THEIR 100TH BIRTHDAY WAS SUPPOSEDLY ASKED IF THEY HAD SEEN A LOT OF CHANGES DURING THEIR LIFETIME. THE PERSON ANSWERED –

**“YES! AND I WAS OPPOSED TO ALL OF THEM.”**

This is a frequent reaction as change is often not our desire nor was it usually our expectation. However, change is inevitable, and it is better if we can anticipate, prepare, and react with purpose and direction.

This past year Baylor Geosciences addressed a lot of changes. We hope our responses will make our students better geoscientists and better prepared for the future. Selected events and changes that I think are important to share are included in the following summary account.

On the international level Dr. Steve Forman was recognized as one of the top 1000 geoscientists in the world in his discipline. This is an extraordinary accomplishment for Dr. Forman and for Baylor Geosciences.

At the national level Baylor’s R1 research status and our athletic success grabbed headlines. Geosciences contributed to both of these accomplishments. Dr. Kenny Befus was prominently displayed in the photo on the R1 banner representing a research scientist exemplary of today’s Baylor as the University celebrated the R1 accomplishment. Geoscience graduate student Jairon McVea made a game saving tackle to seal the Big 12 football championship. Ph.D. student Anna Lesko was awarded national recognition as an outstanding teaching assistant and six other graduate students secured scholarships from beyond the University (see page 44).

Alyssa Mills, PhD Student working with Dr. Peter James, was recently awarded the John Mather Nobel Scholar Award for her internship at the



Goddard Space Flight center. This is a prestigious award given to only 8 interns/early career scientists.

But perhaps the most significant change came in our departmental curriculum. In following the previous name change from Geology to Geosciences we combined our two Bachelors of Science degrees into one B.S. degree in “Geosciences”. The degree name more closely aligns with our departmental name and allows us to offer several areas of concentration within the Geoscience degree. The concentration areas represent some of the expanding breadth that comes with a maturing scientific discipline. The concentration choices include Geology and Geophysics but also include Geochemistry, Biogeoscience, Hydrogeoscience, Planetary Geoscience, Climate Change and Society, and Petroleum Geoscience. We hope this curriculum better prepares our students and attracts more majors.

Although we have not been given permission to hire additional faculty yet, we hope to recruit faculty soon who can lead our department as we develop research areas that compliment our concentration areas.

We would love to hear from you and see you now that in-person events are more feasible. I am excited about the future potential of Baylor Geosciences, and I hope you are too! Come see me if you can.

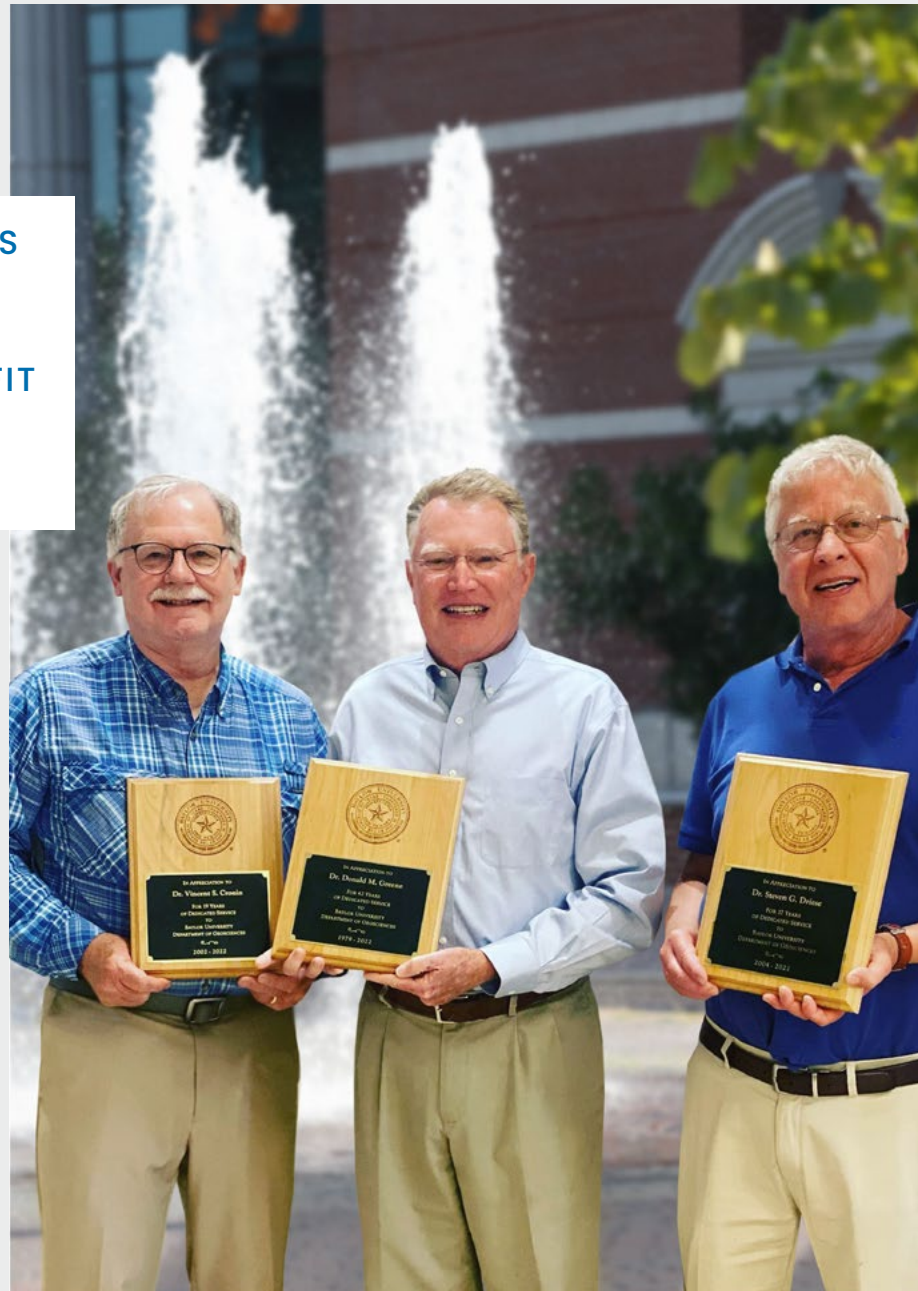
*Dr. Joe C. Yelderman, Jr.*  
– BAYLOR GEOSCIENCES CHAIR



# NEW ADVENTURES AWAIT

**THE BAYLOR GEOSCIENCES DEPARTMENT STARTS THE 2022/2023 ACADEMIC YEAR WITHOUT THE BENEFIT OF OVER 80 YEARS IN GEOSCIENCE EDUCATION.**

Dr. Vince Cronin, Dr. Steve Driese and Dr. Don Greene retired in May 2022 and leave Baylor Geosciences a younger and smaller department with less knowledge of ethics, active faulting, paleopedology, grant writing, geography, and what the weather may be next week. We will miss them as friends, academic colleagues, and special geoscientists, but all three will stay connected to Baylor University as they were selected as Emeritus Professors. Included below are a few highlights regarding each of them.



## DR. VINCE CRONIN

Although Dr. Cronin will no longer teach classes on the Baylor campus, he remains a national leader in geoscience education. Dr. Cronin is the current editor of the AGI/NAGT lab manual in Physical Geology and he is a national leader in geoethics. Dr. Cronin was recently appointed as the Continental Coordinator for North America to the International Association for Promoting Geoethics (IAPG) and has accepted an invitation to join the inaugural editorial board of the Journal of Geoethics and Social Geosciences (JGSG). Finally, he is this year's Richard H. Jahns Distinguished Lecturer for the Environmental and Engineering Geology Division (EEGD) of the Geological Society of America.

## DR. STEVEN G. DRIESE

Dr. Driese served twice as Baylor Geosciences Chair and also served in the Graduate School as the Associate Dean for Research. Dr. Driese was instrumental in leading the Geosciences Department as Baylor University achieved the R-1 research classification. His leadership helped Baylor Geosciences become one of the nation's most respected departments in paleoclimate and paleopedology. One of his contributions was a class he developed and taught in grant writing skills that helped students (and their faculty) write more successful grants. The class was available to students from all STEM disciplines and to honor Dr. Driese, each year the Geosciences Department and the Graduate School combine in giving the "Dr. Steven G. Driese Outstanding Grant Proposal" award to the best proposal written by a Geoscience student and a non-geoscience student. In addition to his honor for creating and teaching the grant writing class, Dr. Driese is also being honored for his collective career work by students and colleagues at the 2022 Annual Meeting for the Geological Society of America (GSA). There are over two dozen presentations and posters by colleagues and students honoring Dr. Driese at the meeting. The organizers of this special session of GSA are four of his former Baylor Geosciences Ph.D. students all of whom are tenure-track faculty at other academic institutions.

## DR. DON GREENE

Dr. Greene was a "class" act as he taught more than 20,000 students during his 44 years in the Baylor Geosciences Department. Dr. Greene served as a local "weatherman" forecasting weather in addition to teaching classes such as Meteorology, Astronomy, and Geography. During his tenure he also mentored several MA thesis students. I "predict" there is a "fair to partly" chance we will miss him as he fades into Sun City.

## IN ADDITION

### DR. KEN WILKINS

Dr. Ken Wilkins also retired in May 2022. He was tenured in the Biology department but was an adjunct professor for Baylor Geosciences as our vertebrate paleontology professor. Dr. Wilkins also served as Associate Dean of Sciences in the School of Arts and Sciences. He participated as a committee member for a number of Geoscience graduate students. He too will be missed.

### DR. JOSEPH WHITE

This may be a little premature but Dr. White will be retiring in spring 2023 and we will miss his scientific guidance to many of our graduate students and his excellent remote sensing class. Dr. White is tenured in Biology but also served as an adjunct professor in Geosciences. He served on numerous graduate student committees and was a frequent co-author with Geosciences students and Faculty. Dr. White served as the inaugural Director of the Institute of Ecological, Earth, and Environmental sciences (TIEES). This program was a truly interdisciplinary Ph.D. program which graduated more than one geoscience-focused student with a Ph.D. in TIEES. Thank you, Joseph.



# 2022 FIELD CAMP



PRACTICING MEASURING STRIKE AND DIP ON THE LEE FACE OF A DUNE AT WHITE SANDS NATIONAL PARK.



PREPPING TO MEASURE THE SECTION.



DISCUSSING HOW TO MEASURE THE SECTION.



LOOKING AT OLIVINE PHENOCRYSTS IN A BASALTIC LAVA FLOW AT VALLEY OF FIRES, NEW MEXICO.



MAPPING IN THE SAN JUAN MOUNTAINS IN SOUTHERN COLORADO.



THE PROJECT IS NOT OVER UNTIL IT IS ALL DRAFTED UP.





## DR. STACY ATCHLEY

PROFESSOR OF PETROLEUM & STRATIGRAPHY

Greetings from Baylor Geosciences, the educational home away from home for many newsletter readers. The 2021–2022 school year has been a banner year for graduations within the Applied Petroleum Studies (APS) work group. Graduates this year include Madison Hood (M.S.), Julia Visy (M.S.), Mason Frucci (M.S., co-advised with Jamey Fulton) and Elisabeth Rau (Ph.D.). Madison graduated in August of 2021, and now resides in Dallas where she now works as a geologist for DeGolyer & MacNaughton. Julia now lives outside of Columbus, Ohio where she’s searching for a full-time job, and most recently had a very successful interview with the Ohio Department of Natural Resources “Division of Oil and Gas Resources Management”. Mason Frucci enjoyed his time as a student in Waco so much that he’s decided to make Waco his home, and now works full time for Magnolia Realty, and therefore indirectly, I suppose, for Waco icons Chip and Joanna Gaines. The graduation of Elisabeth Rau in August of 2022 marked the end of an era, as Elisabeth was the finale female member of the APS Late Devonian Duvernay team to graduate. Elisabeth was preceded in graduation by Duvernay team members Anna Thorson (now with Matador Resources) and Marilyn (Wisler) Hofstra (now with HESS). Elisabeth starts her new career with Matador Resources in September and is excited to be reunited with Anna Thorson. My current students include Bart Yeates (Ph.D., co-advised with Bill Hockaday), Stephanie White (Ph.D., co-advised with Elizabeth Petsios) and Tyler Dowdy (Ph.D.). Bart is the lone surviving member of the Duvernay team and should graduate in December of 2022. Bart currently has his first dissertation manuscript in journal peer-review, and his second

manuscript should be submitted sometime before publication of this newsletter. Stephanie is making great strides on her dissertation project where she is studying the stratigraphy, ecology and paleoclimate of the Late Pennsylvanian to Early Permian of the Paradox Basin, Utah. Stephanie successfully defended her dissertation proposal in May of 2022, and accompanied by myself, Gary Stinchcomb (Baylor Ph.D. 2012, and now Associate Professor at Murray State University, Kentucky), and Gary’s wife Erin, completed her dissertation fieldwork in May 2022 as well. Tyler Dowdy is the newest student within the APS work group. Tyler completed his B.S. degree at the University of Tennessee and is working on a subsurface study of the Jurassic Nordegg Formation of Alberta, Canada. In conjunction with Tyler’s dissertation, I accompanied Tyler and Stephanie to describe core in Calgary during June of 2022.

Our family circumstances have changed little over the past year. Janelle continues her work as the Department of Geosciences account manager and very much enjoys working with office staff members Paulette Penney and Jamie Ruth. Our oldest daughter Dallas is now Operations Manager for Milo All Day in Waco, and our youngest daughter has now completed her 5<sup>th</sup> quarter at the Baylor Law School. I shouldn’t leave out Moh (short for Mohican, as in “last of”) our cat. Moh lives an independent life. He transitions from outdoors to indoors at HIS whim, he is very well fed and therefore large, and occasionally (again at HIS whim) gives Janelle and Audra attention. My relationship with Moh is more-or-less business-like. Best wishes to you all.



5. Elisabeth Rau and Julia Visy at Walnut Canyon, Guadalupe Mountains, New Mexico. 2. Madison Hood on the canyon rim at Honaker Trail, Utah. 1. Mason Frucci (lower left) and Julia Visy (lower central) at the Exshaw Formation outcrop at Crowsnest Lake, Alberta, Canada. 6. Stephanie White dutifully taking notes at Honaker Trail, Utah. 7. Tyler Dowdy in the Big Horn Mountains, Wyoming. 3. Gary and Erin Stinchcomb (Ph.D. 2012, office staff 2010–2013) with Stephanie White at Forrest Gump Point, near Mexican Hat, Utah. 4. Bart Yeates excited about being at White Sands National Park.



FACULTY UPDATES



**DR. KENNY BEFUS**

ASSOCIATE PROFESSOR OF MINERALOGY & PETROLOGY

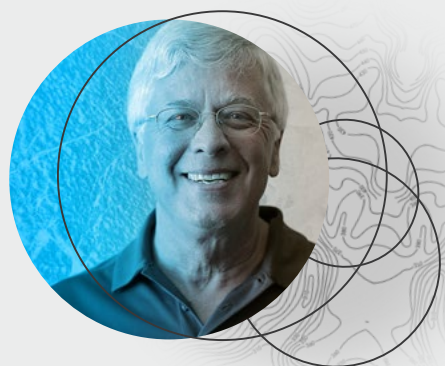
Chelsea Allison, James Thompson, and I welcomed a new PhD student, Emanuel Giovanini, into the research group this year. Emanuel joined us from Rio Cuarto, Argentina. Emanuel is working on tectonic problems, using high-temperature minerals to better understand the temperatures, pressures, and stresses in the deforming lithosphere. We are specifically working on rocks from the mountains of western Argentina. Emanuel and I went there in March for our initial fieldwork. It was a great trip, and the rocks were magnificent. In our travels we happened to drive through the little town of Huaco, so we went from Waco to Huaco (pronounced similarly).

Undergrad George Allen has also joined the hard rock crew. He has brought an enthusiasm and work ethic that have been wonderful. George is researching diamonds, garnets, and diopsides that he has found at Crater of Diamonds State Park, Arkansas. That location is very special as it is the only place in the world where the public can prospect a primary diamond deposit. It is also scientifically very interesting because the composition and source of the magmas are unusual. George's research should help constrain if these diamonds and other minerals are coming from the shallow or deep mantle.



1 – Emanuel's research is in the Valle Fertil mountains of western Argentina. I asked him to 'pose for his mom' in panel 1 and it turned out great. In panel 2 Emanuel and loyal field assistant Tommy examine the geologic map as we look for sampling locations. 2 – Emanuel and I posing on the sign that welcomes travels to Huaco, Argentina "the land of poets." 3 – George Allen collecting lamproite samples from Crater of Diamonds State Park in Panel 1, and he is analyzing his crystals on an electron microprobe at Texas A&M.





## DR. STEVE DRIESE

PROFESSOR OF PALEOPEDOLOGY & SEDIMENTOLOGY

This is my segue into full retirement, which goes into effect on May 31, 2022. I have taught, conducted research, and served as an administrator for Baylor University for 18 years, after initially starting my career at the University of Tennessee 22 years prior to that (1982–2004). I am grateful to my colleague (now A & S College Dean) Dr. Lee Nordt, who was early on a research collaborator and who enticed me to come to Texas to learn about Vertisols, and how lessons learned from modern soils could be applied to the ancient soil record. But after a 40-year career spent in academia I am really ready for retirement and look forward to more time to spend with family and with travel with my wife

Marylaine. Because most of my family resides in Tennessee and Georgia (including my brother Paul, and twin grandchildren Ryan and Maddie), and because I loved the mountains and lakes of eastern Tennessee when I lived here previously, it made sense to move back to Knoxville.

I am proud of the growth in the size of the Department as measured by number of tenure- and tenure-track Geosciences Faculty, and especially in their outputs of research scholarship and external funding, and of the students in the Geosciences Graduate Program, especially in the increase in numbers and research scholarship of the Ph.D. students, which occurred under my watch as

Department Chair (9 years as Chair and 2 years as Interim Chair) and during 3 years as Graduate Program Director. Thankfully as Chair I had the extraordinary wisdom and knowledge of Office Manager Paulette Penney to guide me through the Baylor University bureaucratic maze – I will miss you Paulette! I am also pleased with my work done with the Graduate School as Associate Dean for Research for 5.5 years, where I instituted a program of rigorous external peer evaluation of Ph.D. programs and directed implementation of an ESL program for International Graduate students. I am so happy that Dr. Bill Hockaday is succeeding me in this Associate Dean position in the Graduate School.

Last fall semester I co-taught GEO 5222 Grant-Writing with my colleague Bill Hockaday for the last time. Although I initiated the course in 2006, Bill really added the rigor and focus necessary to make it into a course that appealed to STEM students across the Baylor campus. A best graduate student grant proposal award, co-funded by the Geosciences Department and by the Graduate School, was named in my honor – thank you to Chair Dr. Joe Yelderman, Jr., and Dean Dr. Larry Lyon for instituting this award on my behalf. From 2004–2022 I mentored 10 Ph.D. students and 1 M.S. student to completion of their degrees, and I am proud that five of the Ph.D. students currently hold academic positions at the University of Houston, Murray State University (KY), Tennessee Tech University, James Madison University (VA), and Mansfield University (PA). Several other students are or were employed in the oil & gas industry.

I continue to supervise the research of two remaining Ph.D. students remotely from Knoxville, Yohan Letourmy and Sarah Kogler, who I am confident will finish their degrees. It was nice to see both of them in person when I returned to Waco for the Geosciences Department Retirement Celebration on April 22, 2022, and I hope to return for their respective future defenses. This October, there is a GSA theme oral session that was proposed to GSA by 4 of my former Ph.D. students: Drs. Emily Beverly, Bill Lukens, Lauren Michel, and Gary Stinchcomb, that is entitled: *T19. Soils and Paleosols across Space and Time: A Celebration of Steven G. Driese*. I am deeply honored to be recognized by them and by the paleosol community, and look forward to participating in this session at the GSA Annual Meeting in Denver, Colorado, October 9–12, 2022.

In the spring semester of 2022 I had a sabbatical without teaching that was awarded as part of the buyout package for announcing my retirement two years in advance of the date, and fortunately was able to move to Tennessee in October of 2021 as a consequence both of my injury and rehabilitation from an acute Achilles tear and of a red hot Waco housing market that resulted in a sale of our downtown condominium in just 3 days after listing! My new address is: 7515 Bellingham Drive, Knoxville, TN 37919, and I hope to see visitors passing by the area in the coming years. My daughter Mary Catherine Driese defended her Ph.D. dissertation in Anthropology at Arizona State University and is now “Dr. Driese” as well. We are going to see her in Guatemala in October where she lives and works for an NGO. But more immediately, Marylaine and I have a cruise of the Greek Isles coming up this May that we are greatly looking forward to, representing the start of our post-retirement travels.

(P.S.: I will be continuing to use my Baylor e-mail address, which is available from the Department.)





## DR. STEVE DWORKIN

PROFESSOR OF GEOCHEMISTRY & SEDIMENTARY PETROLOGY

Field camp went well this year – we had 9 students and we travelled over 4,000 miles. The weather treated us very kindly, although we shivered through very cold temperatures on the north rim of the Grand Canyon. The students all got along remarkably well this year, and they did a great job on their maps, cross sections, and measured sections. This was the 30th time that I have taught field camp and I still enjoy it immensely.

Nicole Price finished her Master's this year. Her project used paleosol mineral assemblages to reconstruct Paleogene environmental conditions in the San Juan Basin. Anna Lesko passed her Ph.D. proposal defense and continues to work on her project that focusses on climatic conditions across the K/Pg boundary using rocks from Big Bend. I have a new Ph.D. student coming in this Fall (Jordan Walker) and he will be studying the geochemistry of black shales across the Cenomanian/Turonian boundary of the Western Interior Seaway.

Field work that had to be cancelled during the pandemic was finally able to be completed. A group of us went out over the Christmas Holidays to help Anna Lesko collect paleosols from Big Bend. The field party consisted of me and Anna Lesko along with Stacy Atchley, Will Brewer (Ph.D. student), Venanzio Munyaka (Master's student), and Vivian Yale (undergraduate). A second field outing was conducted with Lyndsay DiPietro, and we collected high resolution imagery that will be used as a teaching aide for virtual field exercises. An example of one of these images can be view at <http://gigapan.com/gigapans/228412> which shows the famous deep water Rader Slide in the Permian Basin.





## FACULTY UPDATES



### DR. STEVE FORMAN

PROFESSOR OF PALEOCLIMATE & GEOHYDROLOGY TECTONICS

#### STUDENT RESEARCH ACCOMPLISHMENT

The past year has been one of transitions with interactions in classes and advising returning mostly to pre-COVID levels, though the shadow of this virus lingers. Also, the impact of faculty attrition with the loss of six faculty, from a cadre of seventeen over two to three years, leaves a large void which remains unfilled. Fortunately, our Geoluminescence Dating Research Laboratory remains vibrant, and the lab crew has emerged from COVID with new ideas and research directions. We see broad horizons on understanding how aeolian, fluvial and hydrologic systems have and will respond to climate change in the recent past and on our currently warming planet.

Alix Fournier in her second year as a PhD student is captivated by a perplexing paradox; that tall dune fields in west Texas stretching 50 to 100 m high have a perched water table with the top of the saturated zone a few meters below the dune surface! This paradox is in full view in the semi-arid Permian Basin, where proppant sand is mined at the top of the Monahans and Kermit dune fields, by a water dredge! These mining operations are plagued by too much water within an active dune field! Alix has stepped up and installed the three groundwater monitoring wells for the Kermit dune field. She has also sampled water for hydrogen and oxygen isotopes, radiocarbon dating, and other chemical analyses to differentiate this “older” water resource from the regional Pecos Valley Aquifer. Alix’s research is highly captivating with \$500 grant award from Graduate School Grant Writing course and \$2000 grant from the Geological Society of America to pursue her unique study in West Texas. Great job Alix!

#### EXTERNAL SUPPORT FOR GRADUATE

##### STUDENTS

We continued to cultivate graduate student support from our research partners. Atlas Sand LLC in Austin, TX for a sixth consecutive year has provided MSc stipend support, specifically for Brady Spears, to test passive geophysical methods to unravel the complex stratigraphy of the Monahans dune field, in collaboration with Prof. Jay Pulliam. Funds from the Bureau of Land Management has supported Alix Fournier’s PhD research for much of 2021-22.

Lastly, Dava Butler, a first year PhD student, has received the inaugural fellowship with funds from the National Park Service, through the Waco Mammoth National Monument to pursue research based at the Monument. Dr. Lindsey Yann, the site paleontologist co-advises Dava and MSc student Maree Yard. Dr. Yann brings new expertise in paleontology, paleoclimatology and environmental isotopic systems, strengthening our mutual research endeavors. She is a very welcome addition to the Dept. of Geosciences.

#### NEW RESEARCH AVENUES

My captivation with eolian systems started when I was an undergraduate and learned about loess “blankets” in central Illinois from my mentor Dr. Leon Follmer, which now carries me to study aeolian systems on Mars. Our attention is now focused on dune landforms on Mars in collaboration with Prof. Ryan Ewing at Texas A & M University and radiation physicists at SWRI, in Boulder CO. Dunes on Mars are extensive and serve to shield many habitable areas from lethal cosmic and galactic radiation. A new method is needed to quantify the migration rate of interplanetary dunes, which are composed of basaltic minerals like pyroxene, plagioclase and olivine, unlike earthy counterparts, dominated by quartz. The “olivine” frontier beckons us to develop new dating systematics, particularly with sample return from Mars in the next decade. We have submitted a proposal to NASA to develop a new interplanetary dating method based on olivine or pyroxene grains, with an Earth analog in the Black Rock Desert, Utah.

A cherished mentor during my PhD studies at the Univ. of Colorado was Prof. Pete Birkeland, who unfortunately passed this year and was impactful to many geomorphologists. He taught me the fine art of how to roll wet soil in one’s hand and to taste a soil to determine particle size distribution in the field. Pete once told me when we were discussing the high prize of NSF funding “Never let the lack of funding keep you from the research that drives you.” Such considerations are a needed counterweight and remind me why we pursue knowledge and discovery of our rapidly changing planet; and what is important to pass on to students.

#### 2021-22 PUBLICATIONS

1. Vilanova, I., Tripaldi, A., Schitteck, K., Rojoe, L., Piovanof, E. L., Forman, S. L., Jobbágy E. G., Heideri, G., Chiesa, J., 2022. Late Holocene environmental and hydro-climatic variability inferred from a shallow lake record, blowout dunes, Argentinian western Pampas, South America. *J. of South American Earth Sciences*.

2. Dalton, A. S., Pico, T., Gowan, E. J., Clague, J. J., Forman, S. L., McMartin, I., Roy, M., Sarala, P., Helmens, K. F., 2022. The marine  $\delta^{18}\text{O}$  record overestimates continental ice volume during Marine Isotope Stage 3. *Global and Planetary Change*.

3. Cox, R. T., Hatcher, R.D., Jr, Forman, S. L., Counts, R., Vaughn, J., Gamble, E., Glasbrenner, J., Warrell, K., Adhikari, N., Pinardi, S., 2022. Synthesis of recent paleoseismic research on Quaternary faulting in the Eastern Tennessee Seismic Zone, Eastern North America: Implications for seismic hazard and intraplate seismicity. *Bull. Seismol. Soc. Amer.* DOI: <https://doi.org/10.1785/0120210209>.

4. Sweeney, M. Forman, S. L., McDonald, E. V., 2022. Contemporary and future dust emission processes and sources from gypsum- and quartz-dominated aeolian systems, New Mexico and Texas, USA. *Geology* 50 (3), 356-360.

5. Forman, S. L., Hockaday, W., Liang, P., Ramsey, A., 2021. Radiocarbon age offsets, ontogenic effects, and potential old carbon contributions from soil organic matter for pre-bomb and modern detritivorous gastropods from central Texas, USA. *Palaeogeography, Palaeoclimatology, Palaeoecology* 583, <https://doi.org/10.1016/j.palaeo.2021.110671>.

6. Bollinger, L., Klinger, Y. Forman, S. L., Chimed, O., Bayasgalan, A. Munkhuu, U., Davaasuren, G. Dolgosuren, T. Enkhee, B., Sodnomsambuu., D., 2021. 25,000 Years Long Seismic Cycle in the Slow Deforming Continental Region of Mongolia. *Science Reports* 11, 17855.

7. Sun, N. Brandon, A. Forman, S. L., Waters, M. R., 2021. Geochemical evidence for Volcanic signatures in sediments of the Younger Dryas Event. *Geochimica et Cosmochimica Acta* 312(1), 57-74.

8. Marin, L.C., Forman, S.L., Todd, V. T., Mayhack, C., Gonzalez, A., Peng, L., 2021. Isolation of quartz grains for optically stimulated luminescence (OSL) dating of Quaternary sediments for paleoenvironmental research. *Journal of Visual Experiments* (174), e62706, doi:10.3791/62706205.

9. Tuttle, M.P., Dyer-Williams, K., Carter, M.W., Forman, S. L., Tucker, K., Fuentes, Z., Velez, C., Bauer, L. M., 2021. The Liquefaction Record of Past Earthquakes in the Central Virginia Seismic Zone, Eastern United States. *Seismological Research Letters* 92(5), 3126-3144.

#### 2020-2021 RESEARCH

##### GRANTS

1. Land surface processes, dust sources and particulate fluxes for the 1930s Dust Bowl Drought area, Great Plains. 6/1/2017-5/31/2022. National Science Foundation, \$266,121,

2. Geomorphology, Paleoethnobotany, and Archaeological Survey of Salado Draw Drainage, eastern New Mexico. P.I. S. L. Forman. 7/30/2020-7/29/2022. SRI/BLM \$62,368.

3. New insights on subsurface architecture of the Atlas Monahans Dune Field, Texas by active and passive source seismology and microgravity surveys. P.I.s S. L. Forman, J. Pulliam and P. James. 5/1/2020-8/30/2022. Atlas Sand/Brigham Minerals \$45,350.

4. Waco Mammoth National Monument Doctoral Graduate Fellowship, P.I. S. L. Forman, 8/1/2021 to 8/31/2027. National Park Service, Department of the Interior, \$166,597.





## DR. JAMES FULTON

ASSISTANT PROFESSOR OF GEOMICROBIOLOGY

Dr. Fulton and students Sanjukta Dhar and Josh Ford are currently preparing presentations for the 2022 Gordon Research Conference on Organic Geochemistry in early August in New Hampshire. The conference was cancelled in 2020 due to Covid-19, and it is exciting to be getting back to normal in communicating new findings in the geosciences. Gordon Conferences provide amazing networking opportunities for graduate students and faculty, and our research group will be coming together with around 180 organic geochemists from around the world to strengthen connections and collaborations.

### MICROBIAL BIOGEOCHEMISTRY LAB

The 2021-2022 academic year in the Microbial Biogeochemistry Lab began with the August 2021 graduation of M.S. student Mason Frucci, who was co-advised by Drs. Fulton and Atchley. His thesis is titled “Regional Elemental and Organic Geochemical Character of the Devonian/Mississippian Exshaw Formation across Alberta, Canada,” and it describes the relationships between elemental and organic geochemical characteristics of a black shale interval with global correlation.

Ph.D. Candidate Sanjukta Dhar continued making good progress toward her degree during her fourth year in the Microbial Biogeochemistry research group. Over the past year she has focused on learning mass spectrometry techniques in porphyrin analysis while working on her first manuscript, “Impact of depositional settings on biogeochemical nutrient cycling in the Western Canada Epeiric Basin during the Devonian–Carboniferous transition.” Her model evaluates spatial variability in carbon and nitrogen isotopic signatures and is important for applications of individual stratigraphic profiles in interpreting past global chemical excursions. The section she is working on includes the Hangenberg Extinction Event, which is the culmination of the Late Devonian Mass Extinction. Sanjukta gave a presentation at the 2021 AGU Fall Meeting.

Josh Ford completed his second year in the Ph.D. program and has started his project analyzing the impact of sea level rise on biogeochemical cycling in coastal microbial mats. He conducted field work on Laguna Madre and Corpus Christi Bay in January 2022 and is implementing and developing biomarker analytical techniques in pigments and lipids. He has proposed new hypotheses for the relationships among pigment biomarkers, populations of photosynthetic microbes, and pathways of nutrient cycles. Josh is also exploring how these relationships affect biomarkers preserved in ancient sediments.

Dr. Fulton has continued collaboration with Baylor Biology faculty in the CRASR (Center for Reservoir and Aquatic Science Research) program, especially in the use of pigments as indicators of photosynthetic populations and pathways of nutrient cycling. Dr. Fulton has also begun a new collaboration on microbial nutrient cycling processes in biological soil crust in drylands settings. He visited field sites in West Texas and New Mexico in May along with collaborators at UTEP and New Mexico State University. Research in the Baylor Microbial Biogeochemistry Lab is now connecting with the NSF-funded Drylands Critical Zone Thematic Cluster, which is centered at UTEP and includes collaborators from universities in Texas, New Mexico, Idaho, and Wyoming.

### TEACHING

During the Spring 2022 semester, Dr. Fulton taught Geomicrobiology. The highlight of the class was a semester-long study of biogeochemical cycling of soil photosynthetic microbial populations in Cameron Park, Waco. The class conducted field work and a lab incubation study to assess limiting factors on microbial growth at the soil surface. Students analyzed carbon and nitrogen isotopes, soil nutrients and pH, elemental and mineral composition, pigments, and intact polar lipids. Final reports demonstrated the students’ ability to synthesize different types of data into a cohesive product while also incorporating their understanding of course material from throughout the semester.

Dr. Fulton gave research presentations at the 2021 GSA and AGU Fall Meetings, taught a four-session class on the oceans and climate change through Lifelong Learning at the Mayborn Museum, and gave outreach presentations through the Baylor Aquatic Science Series and Truett Seminary.



1 Graduate students Vino Sivapalan, Larissa Watkins, Dava Butler, and Josh Ford collecting soil samples at Cameron Park, Waco.  
2 Microbial Biogeochemistry Lab member Josh Ford collecting microbial mat samples from Oso Bay, Corpus Christi.

### RECENT PUBLICATIONS

Wang, J., Wagner, N.D., Fulton, J.M., and Scott, J.T. (2022) Dynamic phycobilin pigment variations in diazotrophic and non-diazotrophic cyanobacteria in batch cultures under different initial nitrogen concentrations. *Frontiers in Microbiology* 13, 850997.

Mansouri, F., Winfield, Z. C., Crain, D. D., Morris, B., Charapata, P., Sabin, R., Potter, C. W., Fulton, J. M., Trumble, S., Usenko, S. (2021) Evidence of multi-decadal behavior and ecosystem-level changes revealed by reconstructed lifetime stable isotope profiles of baleen whale earplugs. *Science of the Total Environment*, 757, 143985.

Wang, J., Wagner, N., Fulton, J. M., Scott, T. (2021) Diazotrophs modulate phycobiliproteins and nitrogen stoichiometry differently than other cyanobacteria in response to light and nitrogen availability. *Limnology and Oceanography* 66, 2333–2345.



## FACULTY UPDATES



### DR. BILL HOCKADAY

ASSOCIATE PROFESSOR OF ORGANIC GEOCHEMISTRY & BIOGEOCHEMISTRY

#### TEACHING & SERVICE

The 2021-2022 was my eleventh year of teaching at Baylor. The *Organic Geochemistry* course was enriched by five dedicated graduate students from more diverse backgrounds than ever before. It was exciting to see their creative application of skill and knowledge from the course to their own research questions and projects. Another noteworthy classroom experience was team-teaching graduate *Grant Writing* with Dr. Steve Driese for his final semester in residence at Baylor University. The course enrolled 18 doctoral students from the departments of geosciences, biology, environmental science, and physics. Helping students from multiple disciplines develop their dissertation research proposals adds to the challenge and fun of teaching this course. It a learning experience for the instructor. In the spirit of growing and strengthening doctoral programs and doctoral student resources, I have joined the graduate school in a part-time, associate dean position focusing on needs in the sciences, mathematics, and engineering.

#### STUDENT RESEARCH

Research in the Hockaday lab is shifting focus back to terrestrial biogeochemistry. Ms. Zhao Wang's dissertation interrogates lipid molecules produced in the leaves of Oak and Juniper trees. She has found compelling statistical correlations of specific molecular concentrations with temperature, light intensity, and water deficit. The eventual application of these correlations will be to sediment records as "proxies" for reconstructing terrestrial paleoenvironments. Mr. Vino Sivapalan is building chemical proxies for understanding the intensity and severity of wildfires in the sediment record. Mr. Burke Leonce is rounding out the final chapter of his dissertation in which he is characterizing the chemical alteration of dissolved organic matter by sunlight (photochemical reactions).



Students in the GEO 5222 Grant Writing Seminar with Steve Driese via Zoom

#### STUDENT ACCOMPLISHMENTS

Ms. Zhao Wang and Mr. Burke Leonce both had dissertation research papers accepted for publication this year. Zhao will publish in the journal *Organic Geochemistry*, methods she has developed for streamlining and partially automating lipid extraction and cleanup. Zhao was also awarded Baylor's dissertation fellowship to spend the summer focused on organizing data and writing manuscripts/chapters for publication. Burke's second dissertation chapter examining the adsorption of organic molecules to the mineral, ferrihydrite, has been published in the American Chemical Society journal, *Earth and Space Chemistry*.

#### ALUMNI NEWS

I am proud of the many successes of our current and former students and it is hard to list them all here. But a few highlights I want to share include Dr. Rixiang (Alex) Huang, who is a former student of professor Boris Lau. Alex is now a professor at State University of New York (SUNY), Albany. Alex received a grant from National Science Foundation to study the mechanisms of decomposition for one of the least understood forms of carbon, known as black carbon. Alex has contracted with my lab to help with the interpretation of mass spectrometry data. Former student Owen Craven is having a successful career as geologist with APTIM Environmental in Dallas. Owen contacted me this year seeking Baylor student interns who wish to train in the field of soil and water remediation.

Please follow and stay in touch with us at [https://sites.baylor.edu/william\\_hockaday/](https://sites.baylor.edu/william_hockaday/)

#### RECENT PUBLICATIONS

Zhao Wang, Joseph D. White, Jonathan Thomas, William C. Hockaday, A streamlined method for pressurized extraction and fractionation of leaf lipids, *Organic Geochemistry* (accepted July 2022)

Burke C. Leonce, William C. Hockaday, Manyiel Mel, Marie Manzi, Omar Harvey, Sorption Dynamics and Energetics of Cinnamic Acid and its derivatives at the ferrihydrite-water interface determined by flow-adsorption microcalorimetry, *ACS Earth & Space Chemistry*, 6, 4, 2022 DOI: [10.1021/acsearthspacechem.1c00411](https://doi.org/10.1021/acsearthspacechem.1c00411)

Wenjuan Huang, Kefeng Wang, Chelong Ye, William C. Hockaday, Gangsheng Wang, Steven J. Hall, High carbon losses from oxygen-limited soils challenge biogeochemical theory and model assumptions, *Global Change Biology*, 2021 DOI: [10.1111/gcb.15867](https://doi.org/10.1111/gcb.15867)

Steven Forman, William Hockaday, Peng Liang, Ashley Ramsey, Radiocarbon age offsets, ontologic effects, and potential old carbon contributions from soil organic matter for pre-bomb and modern detritivorous gastropods in central Texas, USA, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 2021 DOI: [10.1016/j.palaeo.2021.110671](https://doi.org/10.1016/j.palaeo.2021.110671)





## DR. PETER JAMES

ASSISTANT PROFESSOR OF GEOPHYSICS & PLANETARY SCIENCE

We are happy to report that our lab group has begun to regain a sense of normalcy in the wake of the pandemic. Our weekly lab groups are well attended by postdoctoral researchers, Ph.D. candidates, M.S. students, undergraduates, as well as some participants from other research groups. The group is larger and more diverse than ever!

In a milestone for our research group, we celebrated the first two graduates from our group. Rudger Dame successfully defended his M.S. thesis on “Gravitational Indications of Subduction on Venus”. This project identified the presence of subducted lithosphere slabs on Venus using gravity gradients, and it showed that slabs on Venus are less dense than slabs on Earth. Rudger’s thesis provides an important insight into the question of why Earth has plate tectonics and Venus does not. The project also lays the groundwork for future mission data analysis from NASA’s Veritas spacecraft.

Christopher Mitchell also defended his M.S. thesis: “Impact Induced Porosity of Terrestrial Impact Craters: A Gravity Study of Meteor Crater”. Chris’s work characterized the extent and distribution of impact-induced porosity, which will facilitate an ongoing collaboration with researchers at Purdue University.

A number of long-running research projects related to the planet Mercury came to fruition this year. *Watters et al.*, published in *GRL*, identified a correlation between mantle flow and thickened crust, and a figure from our paper was chosen to be the journal’s cover art. *Goossens et al.*, published in *Planetary Science Journal*, presented results of a NASA-funded project to characterize Mercury’s lithosphere. *Genova et al.*, submitted to the journal *Icarus*, shows that Mercury’s crust has an average bulk density of  $2540 \text{ kg/m}^3$ , which implies that Mercury, Mars, and the Moon all have similar porosities in their upper crusts.



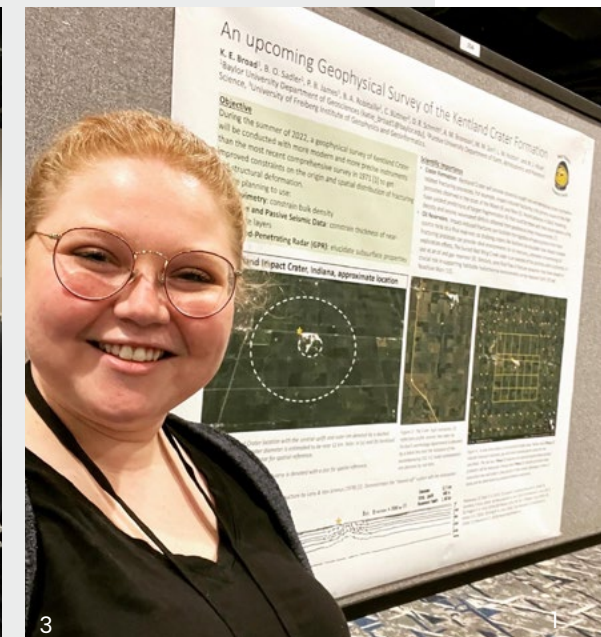
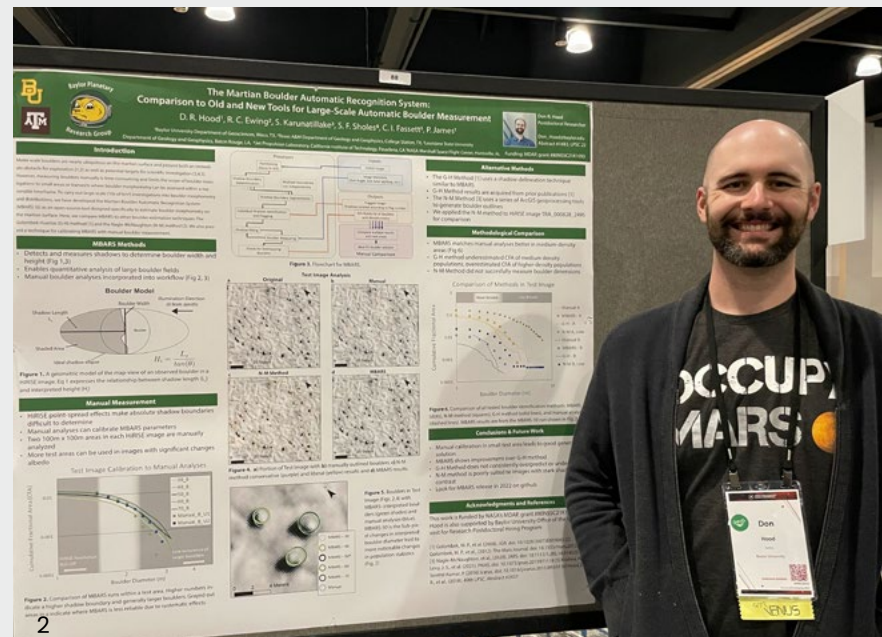
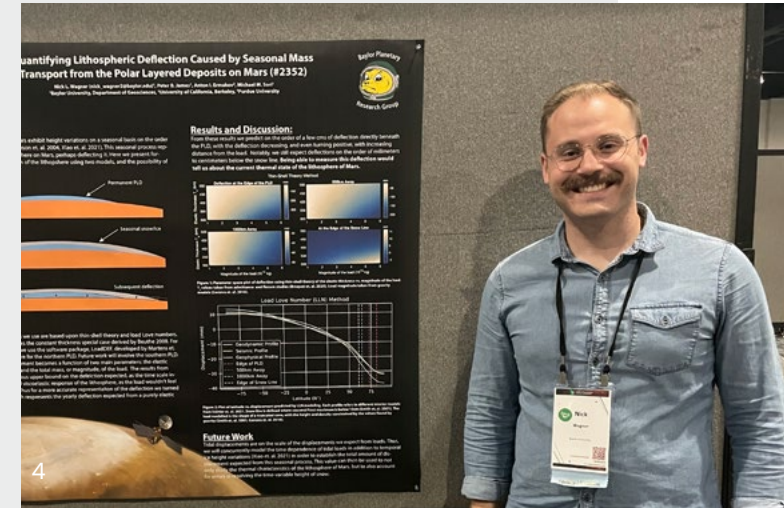
We will be welcoming a new Ph.D. student to our research group this fall: Alyssa Mills is currently finishing her M.S. degree at University of Alabama on the topic of planetary magnetic fields. Alyssa will join the Planetary Research Group in the fall to further expand her expertise in planetary geophysics.

A few undergraduates have also begun pursuing research in our group: Skylar Hoover is a rising junior working with Katie Broad and Ben Sadler to study how crater-forming impacts induce porosity in the ground; this work is funded through a grant by the American Chemical Society’s Petroleum Research Fund. Allie North has also started working in our lab this summer as a part of Baylor’s BTRUE summer fellows program. Allie has been collaborating with Dr. Jeff Lee to study impact ejecta on the Moon, and she is also interested in studying silicic volcanoes on the Moon. There will be much more of this to come: we’ve recently learned that we won a grant from NASA’s Lunar Data Analysis program to continue pursuing our lunar volcanism project in the coming years!

If you would like to learn more about the fledgling Planetary Research Group, visit the page for our research group: <http://baylorplanetary.com>

Or, follow the Planetary Research Group on Twitter: @baylorplanetary

I periodically tweet about research snippets and various science topics with my Twitter handle: @peterbjames



1 An artist's depiction of NASA's MESSENGER spacecraft, the first spacecraft to orbit Mercury. Credits: NASA / JHU-APL / Carnegie Institution of Washington  
 2 Postdoctoral researcher Don Hood, presenting his Martian boulder detection algorithm at the Lunar and Planetary Science conference. 3 Ph.D. student Katie Broad, presenting her preliminary plan for a crater gravity survey at the Lunar and Planetary Science conference. 4 Ph.D. candidate Nick Wagner, presenting his analysis of martian lithosphere deflection caused by seasonal ice deposits at the Lunar and Planetary Science conference.



FACULTY UPDATES



DR. DAN PEPPE

ASSOCIATE PROFESSOR

This past year was a fun and successful year for my research group. I've continued my research on reconstructing terrestrial ecosystems in the Paleocene and Neogene. I continue to work on several projects including on early Miocene and Plio-Pleistocene environments in eastern Africa, on early Paleocene ecosystems in the San Juan Basin in New Mexico, and on developing and refining fossil leaf based proxies for reconstructing climate and ecology in the past. Most excitingly, the summer of 2022 was the first time I have been able to head back to eastern Africa for field research since 2019!

Additionally, there were lots of great things happening in my lab. Three new students, Jie Geng, Venanzio Munyaka, and Des Thorne, and a postdoctoral researcher, Sifan Koriche, joined my lab. PhD student Kahsay Nugsse Tesfay continued to make great progress on his dissertation research, and two students, Danielle Gygi and Joe Milligan completed their degrees and graduated.

Jie Geng and Des Thorne are both MS students and are working on reconstructing different aspects of early Paleocene ecosystems in the San Juan Basin in New Mexico, USA. They both conducted fieldwork this summer and collected some beautiful fossil leaves! Des and Jie will each be presenting some of the results of their MS thesis work at GSA in fall 2022.

Venanzio Munyaka is a PhD student who is working on early Miocene floras in eastern Africa. This summer, he conducted fieldwork in Kenya and collected an early Miocene flora from an important fossils site called Koru. He then spent a month at the National Museum of Kenya in Nairobi working

to describe, photograph, and identify the fossil leaves. He's presenting some of his results at GSA this fall.

Kahsay Nugsse Tesfay is a PhD student who is working on the magnetostratigraphy of the Gona Paleanthropological Research area in the Afar Rift of Ethiopia. He's measured and analyzed a large number of samples and has some great results that have important implication for our understanding of the age of early hominin fossils. He's presenting the results of this work at AGU in fall 2022 and we are hoping to conduct fieldwork in winter 2023!



Sifan Koriche joins my lab from the University of Redding in the UK and is an expert in hydrological modeling. He is working on understanding the lake level history of Lake Victoria and has spent the past year developing a water budget model for Lake Victoria and trying to understand the drivers of lake level change. He's working on a manuscript on his work and will be leading a session at AGU focused on the relationship between climate and lakes.

Danielle Gygi graduated in May 2022 with her MS degree after completing a terrific thesis on early Paleocene fossil leaves from the San Juan Basin. After graduating she started a job in environmental services at Whitehear E.S. LLC in Dallas, TX.

Joe Milligan graduated with his PhD in May 2022. His dissertation was focused on modern and fossil leaves. His first paper, which focuses on a set of growth experiments where he grew Sycamores at the Lake Waco Wetlands under different light conditions. He found that there is a remarkable strong relationship between aspects of cell morphology and light availability, which also be quantified in fossils. Using these relationships, Joe is working to develop a proxy for shade cover that can be applied to fossil leaves that we've collected in the San Juan Basin in New Mexico. This work was published in the American Journal of Botany in 2021. The other parts of his dissertation focuses on developing a Sycamore-specific proxy for CO<sub>2</sub> and on reconstructing ancient CO<sub>2</sub> levels from early Paleocene floras in the San Juan Basin, part of which was published in Paleoceanography and Paleoclimatology in 2022. Joe started a Deep Time: Peter Buck Postdoctoral Fellowship at the Smithsonian, in January 2022.

In summer 2022, I spent a good chunk of the summer in eastern Africa. I conducted fieldwork on early Miocene sites in western Kenya, near Lake Victoria, and in northern Kenya, near Lake Turkana. I also co-lead a workshop on Lake Victoria's climate history in Dar es Salaam, Tanzania. It was great to be back in the field and conducting research again! This year also marked my last year as the department's Graduate Program Director. I have really enjoyed working with our graduate students during my tenure as GPD. I'm looking forward to a great 2022-2023 year to come!



1 Field camp at the early Miocene site, Koru, Kenya. 2 Fieldwork in Lake Turkana, Kenya. 3 Lab group photo after Joe and Danielle's graduation. 4 Venanzio Munyaka and interns from the National Museums of Kenya collecting fossils at Koru, Kenya. 5 Early Miocene fossil leaves from Koru, Kenya. 6 Baylor undergraduate Geosciences majors measuring stratigraphic sections at an outcrop of Fredericksburg Group rocks in Oglesby, Texas.





## DR. ELIZABETH PETSIOS

ASSISTANT PROFESSOR OF PALEONTOLOGY

This year, my lab consisted of my graduate student, Nathan Wright and Stephanie White, my postdoc, Brendan Anderson, and undergraduate researchers Dakota Gavin, Victoria Holman, and Brandon Nombrana. Nathan, Stephanie, Brendan, and Dakota have been with the lab for two years now, while Victoria and Brandon just started this year. We are looking forward to the addition of Jerrad Watts, coming to use from Fort Hays University, who will be starting in August as my newest PhD graduate student. As an undergraduate, Jerrad had worked on fossils with Aly Baumgartner, a recent graduate from Baylor Geosciences and current paleontology collections manager at Sternberg Museum Natural History. Over the summer, Stephanie, Stacy Atchley and I visited Stephanie's research sites in Paradox Basin, Utah. Nathan, Brendan, and I traveled to Gainesville and St. Petersburg

Florida, to work with the collections of the Florida Museum of Natural History and the Florida Fish and Wildlife Conservation Commission. We also had the opportunity to collect Eocene fossils from the Gainesville area and Plio-Pleistocene fossils from the Sarasota area. Nathan will be returning to St. Pete's this summer to set up experimental arrays in their marina for his dissertation. The three of us also had the opportunity to work with the paleontological and biological collections of the Natural History Museum of Los Angeles County in the Spring. We were able to schedule a half-day expedition on the RV Yellowfin to collect biological specimens off the coast of San Pedro and Rancho Palos Verdes.

In other news, I chaperoned the Baylor Association of Women Geoscientists annual camping trip to Lake St. Catherine and Hot Spring National Park in Arkansas in the Spring. There, we met up with another former graduate of the department, Rebecca Taormina, now an assistant professor at National Park College.

All-in-all, it's been a great year to get back out there and reconnect with old colleagues and students, revisit scientifically and personally important places, and get to witness the journeys and success of those people in our lives.



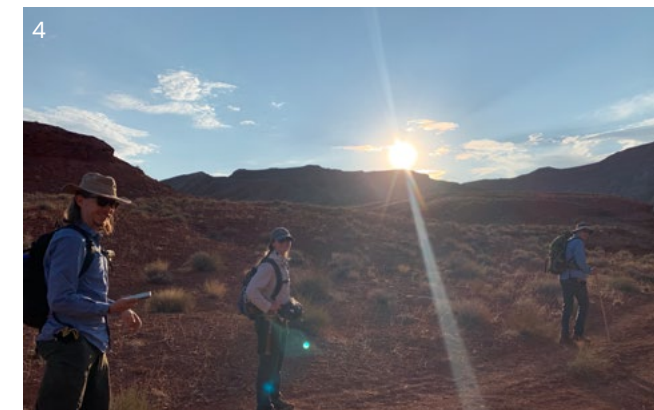
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1 Collecting in a fossil quarry near Sarasota, Florida.  
2 BAWG at a waterfall on the trail at Lake St. Catherine campground, Arkansas.  
3 On the RV Yellowfin by San Pedro, California.  
4 Trail to Raplee Anticline, Paradox Basin, Utah.



## FACULTY UPDATES



### DR. JAY PULLIAM

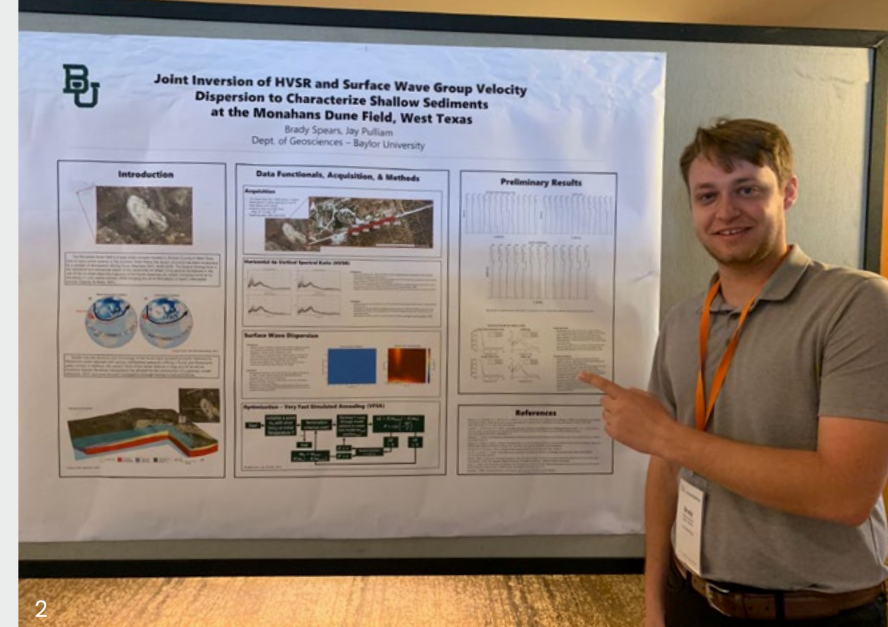
W.M. KECK FOUNDATION PROFESSOR OF GEOPHYSICS  
& GRADUATE PROGRAM DIRECTOR

The seismology group picked up momentum this year after being slowed by the COVID pandemic previously. As noted in last year's newsletter, we acquired several types of data at the Monahans sand dunes, in west Texas, last May and MS candidate Brady Spears worked is getting good modeling results by jointly fitting Horizontal-to-Vertical Spectral Ratios (HVSr) and surface wave dispersion data. He has been aided considerably by the parallel code Debajeet Barman wrote for his own research, which is a lithospheric-scale study of the southeastern United States. The principles are the same, although Brady is modeling just the top 30-50 m at Monahans. Joseph Thangraj received his PhD in December 2021 and is now employed as a data scientist in Boston. Among continuing members of the group, Hannah Mejia and Debajeet Barman continue their work on the NE Caribbean and southeastern United States, respectively, and Ben Sadler is getting impressive results in his efforts to jointly model autocorrelations and receiver functions in deep basins, primarily in the Permian Basin so far. Ben was awarded a \$2000 fellowship by the Fort Worth Geological Society in May 2022.

Yashwant Soni, who joined us last year from the Indian School of Mines, was elevated to PhD candidacy as a result of successfully presenting and defending his proposal in May 2022. M.S. candidate Aicha Coulibaly is writing her thesis on body wave tomography of Texas, Oklahoma, and eastern New Mexico. She, Brady, and Debajeet all plan to finish their degrees this calendar year. New PhD students Nnamdi Ajah joined us in August 2021 from Nigeria and Sandra Rosero Ruedo joined

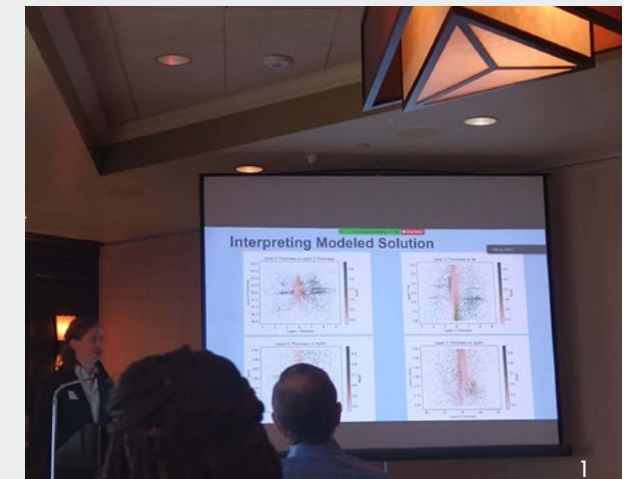
us in January 2022 from Colombia (although she had been working at the Puerto Rico Seismic Network since 2018).

Several of us attended and presented research results at the 2021 Fall meeting of the American Geophysical Union in New Orleans and two (Brady and Debajeet) attended and presented their research at the annual meeting of the Seismological Society of America. I think we were all happy to see the return of in-person meetings after two years of remote or hybrid meetings. One of the many benefits is that all our students are receiving job offers now, which is partly a result of the networking that is enabled by in-person meetings... although changes in the job market are the more likely the cause. Data science is now a popular avenue for our graduates. By my count our last three graduates are now employed as data scientists, although that streak is about to break with this year's graduates, I believe.



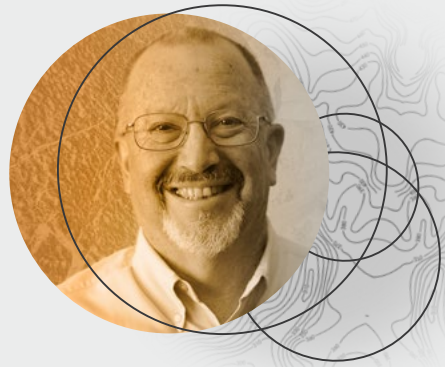
1 FWGS is "Fort Worth Geological Society". Ben Sadler was awarded a fellowship early this month by them and several students went with him to the luncheon/ceremony  
2 SSA is "Seismological Society of America". Brady gave a poster at their annual meeting in April.

In other news, we are renewing our collaboration with the National Center for Seismology, an organized research unit of the Autonomous University of Santo Domingo, to acquire new data on the island of Hispaniola and to create a more comprehensive earthquake catalog that includes a locally-calibrated local magnitude scale. We also submitted a large-budget, collaborative research proposal with colleagues from seven institutions to the National Science Foundation. In that project we would acquire and model new seismic and magnetotelluric data to better understand the process by which the original Tobosa Basin evolved to the modern-day Permian Basin.





## FACULTY UPDATES



# DR. JOE YELDERMAN

PROFESSOR OF HYDROGEOLOGY

### RECHARGE

New MS student Rebekah Sowders represents the graduate recharge to the hydrogeoscience group. Rebekah received her BS from Texas Tech and will be interning with the Southern Trinity Groundwater Conservation District while pursuing her MS degree at Baylor. Vivian Yale is contributing to the undergraduate recharge by starting a BS thesis with Dr. Joe. Vivian will be studying hydrogeologic responses to stressors in the Brazos River Alluvium aquifer. Welcome Rebekah and Vivian!

### DISCHARGE

In spite of the Texas drought, the hydrogeoscience program discharge included quantity and quality. Oregon native, August Dreyer, received his BS with a double major in Geology and Economics after finishing his senior thesis and he immediately accepted an internship with the Brazos River Authority. August also received the R.T. Hill award for the outstanding undergraduate geoscience student. Claudia Dawson and Toluani Soares both received their MS degrees and are now gainfully employed in the workforce. Tolu is in the DFW Metroplex, and Claudia chose Nashville,

Tennessee. Adios to August, Claudia, and Tolu. We will miss them and are confident The Brazos River, Nashville and the Metroplex will be better off with this new geoscience talent in action. Dr. Joe knows you win some and you lose some, but it is the students that matter. After watching MS student Jairon McVea (BU-BS 2020), make a game winning tackle in the Big 12 Championship game, Dr. Joe lost Jairon to the Superbowl Champion Los Angeles Rams who signed him to a Free-Agent contract. Jairon plans to finish his degree in the offseason and we wish him all the best as he tries to make the team.

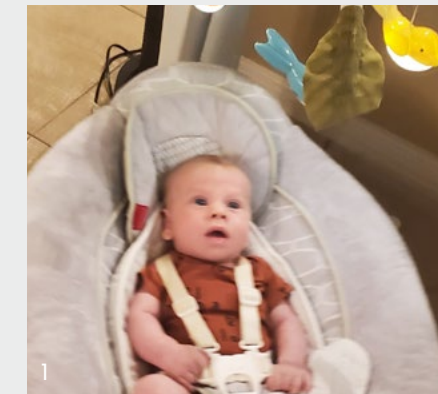
### STORAGE

Will Brewer, Ph.D. student in the Institute of Ecological, Earth, and Environmental sciences, and Toluwaleke Ajayi ("A. J."), PhD student in Geoscience, represent the storage in Dr. Joe's educational aquifer. Will and Dr. Joe both submitted applications to AGU that were accepted and they now plan to attend the Chapman Conference on Solving Water Availability Challenges through an Interdisciplinary Framework

in Golden Colorado this fall. Will also attended the Texas Section of the American Institute of Professional Geologists in Austin, Texas, where he and Dr. Joe toured the Bureau of Economic Geology core lab facility and learned about new opportunities in Geothermal Energy, Hydrogen Gas Storage, and Carbon Sequestration. Will, who has degrees in psychology and geology, also related well to the interdisciplinary research presented by Dr. Bridget Scanlon that involved social scientists as well as geoscientists regarding Water Infrastructure Revitalization. While completing his first year toward the Ph.D. degree, A.J. received the Elan Alan Safety Scholarship from Baylor Geosciences and the E. Russel Lloyd Memorial Scholarship from the West Texas Geological Society. He and Dr. Joe have applied to the Clearwater Underground Water Conservation District for funding to use geophysics to better understand the pathways in the Edwards aquifer that recharge Robertson Spring near Salado, Texas, which provides habitat for a salamander species federally listed as "Threatened".

### FAMILY

Daughter Abigail and son-in-law Jared White live in Plano, Texas with granddaughter Kennedy (5 yrs.), grandson Hamilton (5th grade), and granddaughter Madison (7th Grade!). Son Cal, daughter-in-law Rachel, and granddaughters Elizabeth (5 yrs.) and Ada-Marie (3 yrs.), plus new grandson Joe Calvin Yelderman IV live in Buda, Texas, where Cal is a product owner for Mitratch. Son Logan received tenure this year and promotion to Associate Professor of Psychology at Prairie View University. Logan and daughter-in-law Rachel Beth, grandson Bryce (8 yrs.), grandson Nolan (6 yrs.), grandson Beau (4 yrs.), and grandson Ty (2 yrs.) live near Brenham, Texas. Diane is enjoying retirement while helping on the home front babysitting grandchildren, staying active in Bible study with friends, and serving at Columbus Avenue Baptist Church with internationals and the food pantry. Dr. Joe continues to serve as a deacon and Sunday School teacher with his loving wife of 47 years. The Yeldermans still live at 706 Woodland West, Woodway, Texas, and visitors are always welcome.



1 Joe Calvin Yelderman IV may be a bird watcher like his Grandfather.  
2 Toluwaleke Ajayi at Robertson Spring.  
3 Will Brewer at the Bureau of Economic Geology Lab Storage Facility during the AIPG GeoDayZ conference.







# SHARON BROWNING

GEOLOGY FRESHMAN LABORATORY COORDINATOR

## FLEXIBILITY IN ALL THAT WE DO

This year has been a continued awareness of the COVID-19 virus and our need to remain flexible with our students as we navigate challenges. We have maintained our online lab material, not only for quarantined students but for any struggling with illness. Thankfully, most classes this year have been face-to-face, with the exception of summer. We have maintained our online discussion boards and assessments and continued to limit lab enrollment and utilize sanitizing procedures. TA meetings were held face to face again, a welcome return for me. One introductory lab continued to be taught online during Spring 2021 but returned to normal instruction by Fall. One TA continued to request an alternative assignment and was accommodated.

I elected not to attend the Earth Educator Rendezvous in July 2021 due to the planned online format, but instead worked with Wayne Hamilton and other faculty to increase our freshman enrollment, recruit more undergraduate majors, and raise the awareness of our department across campus. Wayne and I communicated with several groups of academic advisors across campus including the College of Arts and Sciences, undecided majors, and the Baylor Business School. In addition, representatives from new student experiences and recruiting were also contacted. Introductory class flyers were developed to share with advisor teams that indicated which university requirements our courses satisfied. Faculty also modified our undergraduate curriculum to more accurately represent research groups and offer new courses to our students. Time will tell where our efforts are best focused.



Some of our outreach activities were able to occur in 2021, most notably the "Sic Em Science Day in October of 2021 at the Mayborn Museum, our first outreach with them since March 13, 2020. Our activities included our rock and mineral identification and fossil identification. Faculty member, Dr. Elizabeth Petsios, participated as well as Ph.D. graduate student, Burke Leonce, all appropriately masked.

I was able to give an adapted presentation to the Waco Master Naturalists in November 2021. This is our 6<sup>th</sup> year to work with this excellent community group in their engagement with the natural world. The presentation was outside at Mother Neff State Park, a welcome venue during our continued social distancing.

2021 also saw the Central Texas Science and Engineering Fair held virtually, where the online format allowed me to participate in judging student projects.

On a personal note, my daughter celebrated her December 2020 Baylor graduation in May of 2021 at McLane Stadium. Although many of her graduating class were not able to attend, it was a joy to watch her accept her diploma and to celebrate with our family who had traveled from Florida to share the day. I hope this pandemic will soon be behind us and remain curious about the future.

1 Ph.D. graduate student, Burke Leonce, and lab coordinator, Sharon Browning, at Sic 'Em Science Day at the Mayborn Museum.

2 Mayborn Museum visitors examining faculty member, Dr. Elizabeth Petsios', fossil specimens.



# WAYNE HAMILTON

PROGRAM CONSULTANT & LAB SAFETY COORDINATOR

## TEACHING SUPPORT

I assisted Dr. Joe with his fall 2021 Hydrogeology and Water Management classes and then the spring 2022 Water Management class. The classes met twice a week and gave me interaction with the students to discuss and support Dr. Joe's teaching. When Dr. Joe had Chair duty conflicts, I was able to substitute teach and keep the classes on schedule. Also, my support consisted of posting class information on Canvas, assisting with field labs, and encouraging students in class. All in all, the classes were a fun group of kids that I enjoyed being with and watching them learn how Geosciences applies to their careers and life.

## STUDENT ASSISTANCE

My goal was to help undergraduate and graduate students to work both safely and effectively in the lab and field to obtain quality research data for the BS and MS theses. I assisted Claudia Dawson with her groundwater sampling of the Brazos River Alluvium aquifer by measuring water levels, uploading data from loggers, and conducting aquifer slug tests. Also, I scheduled weekly meetings with August Dreyer and Jairon Mc Vea to be a sounding board for their research projects.

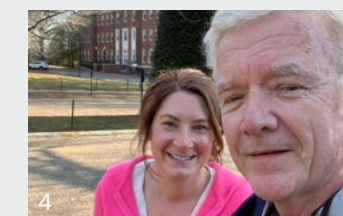
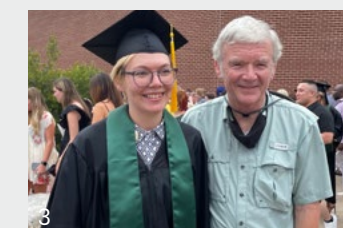
In October 2021 at the GSA national meeting, in Portland, Oregon, I made a presentation entitled: *Applying COVID-19 Lessons to Future Classroom, Field and Research Learnings* with Dr. Joe. The presentation told the story of our classroom and field labs COVID experiences over the last 18 months. Also, in March 2022 at GSA South-Central I co-authored a presentation with Drs. Yelderman and Atchley, plus Sharon Browning titled: *Teaching Geosciences in a Changing Climate: It's Hard to Teach Students Who Aren't in Your Class*.

## GEOSCIENCES RECRUITING

During the summer and fall of 2021 I worked with the department on marketing the Geosciences Department at various Baylor campus outreach events. The outreach work included developing department and class flyers and presentations to be used with Baylor student advisors and new to campus student programs. We participated in new student Orientation sessions and Welcome Week opportunities to make students aware of Geosciences course offerings, degree plans and career paths. Also, we communicated with on-campus students during new-to-Baylor programs via text messages and led tours of the department.

## CLOSING

I'm thankful for Baylor giving me this second life career after retiring from Shell Oil Company seven years ago. These seven years of learnings and relationships with students, staff and faculty have enriched my life. I am looking forward to continuing to serve Baylor University and the department.



1 Dr. Joe Water Management Field Trip to Tonkawa Falls, Crawford, Texas  
2 Claudia Dawson uploading piezometer data for her MS Thesis.  
3 Taylor Watson at Baylor's graduation ceremony with Wayne Hamilton  
4 Wayne with Helen Jane Long, British Composer, musician, and pianist before her concert in Fredericksburg, VA  
5 Wayne and Mary on their 40th Wedding Anniversary





# LILIANA MARIN

LAB MANAGER, GEOLUMINESCENCE DATING RESEARCH LAB

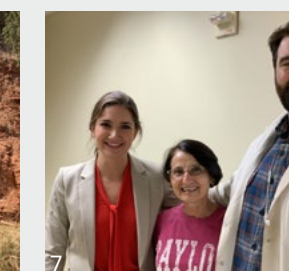
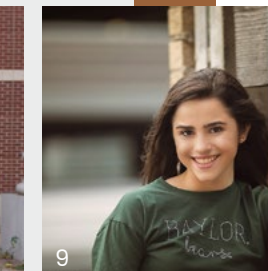
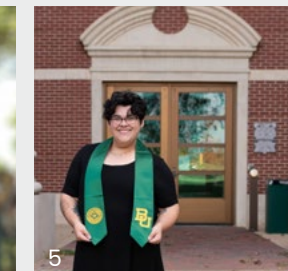
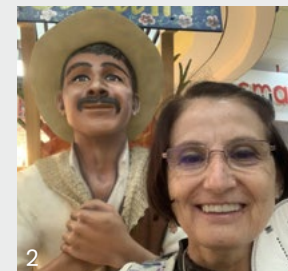
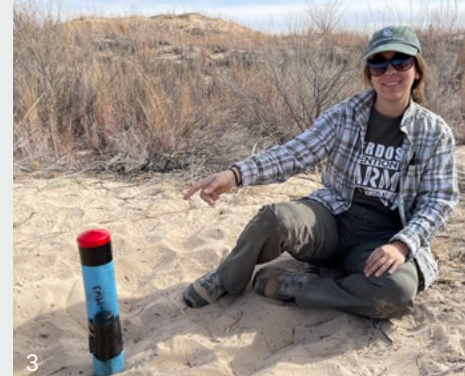
The Geoluminescence Dating Research Laboratory (BG Lab), within the Dept. of Geoscience at Baylor University is a facility equipped for Optically Stimulated Luminescence (OSL) dating, a form of geochronology, quantifying the radiation and dosimetry properties of common minerals that can provide depositional ages for the past 0.6 million years. These chronologies inform tectonic, hydrologic, paleoenvironmental, paleoclimatology and anthropological studies for internal and external research groups. Our research in the lab focusses on addressing “grand challenges” such as evaluating the timing and pace of climate change, as reflected in drought and flood records, the spatial and temporal distribution of intraplate seismicity, and the timing of the inhabitation of the Americas.

This laboratory is unique in Texas, one among seven labs in the U.S., the only one bilingual; this enables fluid communications with colleges in LATAM and the Iberic Peninsula. The BG Lab promotes cutting- edge research visibility for the University and it is known for pursuing meticulous, resourceful, and timely research. We produce a continuous stream of data that requires daily analysis and statistical evaluation to maintain quality control. Through projects advanced with external partners, the lab generates funds that support expenditures for lab and stipends for graduate and undergraduate students.

In contrast with 2020, when the pandemic arrested the research, 2021 was prolific in projects, catching up for delayed analyses and starting new research. After much effort, we increased the amount of international and national collaborative research projects and prepared 225 samples for dating. Also, this year, the lab has contributed to the scholarship, with two papers submitted for publication: The first paper: “Isolation of quartz grains for optically stimulated luminescence (OSL) dating of Quaternary sediments for paleoenvironmental research.” By Liliانا C. Marin, Steven L. Forman, Victoria T. Todd, Connor Mayhack, and Ashley Gonzalez, published in the *Journal of Visual Experiments*, which documents important procedures in our lab for the global community. The second paper “Late Quaternary stratigraphy aeolian environments, luminescence chronology and environmental climate change for the Monahans dune field, Winkler County, West Texas, USA.” By Forman, S. L., Tew-Todd, V., Mayhack, C., Marín, L.C., Wiest, L., currently under revision by the *Aeolian Research Journal*.

After two long serving and trusted-senior students graduated, Connor Mayhack and Tori-Tew Todd, in summer 2021, a new cadre of students emerged to carry forth. Thus, I had the opportunity to start mentoring and training new graduates and undergraduates. I have worked with PhD candidates Alix Fournier and Daniel Shi, undergraduate students Bradley King from the Geosciences and Annabeth Castronovo from the Environmental Sciences, and Ashley Gonzalez from Anthropology. With these students, we have experimented with new techniques of TT-OSL, IRSL and OSL, we have tried a new mineralogy, e.g., olivine and orthopyroxene with very promising results for future applications, such as for potential sample return from Mars. Beyond the OSL techniques, I mentor the students in other skills such as critical thinking, sedimentology, mineralogy, laboratory safety procedures, and data and time management. As always, the student academic and personal success is the priority for this group. Beyond the fulltime work in the lab, I continue teaching the summer online 1401 Earthquakes and Other Natural Disasters class-

The summary of the year is positive, we have regained scientific activity with renewed fieldwork. This renewal resulted in an appreciable volume of projects to the BG lab. New graduate and undergraduate students are now working in the lab, in a friendly academic community. Their tenure in the lab often is an inspirational experience that guides them to better academic outcomes. Though the pandemic arrested in-classroom teaching of 1401 Earthquakes and Other Natural Disaster course, I am hopeful that new opportunities will avail to teach in person, with recent retirement of five faculty.



1 Steve and Luna (canine) working at the Palo Duro Canyon (TX). 2 Liliانا with Juan Valdez at the Colombian airport. 3 Alix working at the Kermit Sand Dunes in Texas, testing one well at the dune field. 4 From right to left Ashley Gonzalez Daniel Shi and Jasmine Kidwell working with the Geoprobe at the Kermit dune field in December 2021. 5 Anthropology graduate Ashley Gonzalez. 6 Geosciences Bradley King. 7 From left to right: Tori Tew-Todd, Liliانا Marin, and Connor Mayhack. 8 Goodbye lunch for our dear BG Lab students. From left to right Connor, Annabeth, Tori, Ashley, August, Bradley, Alix, and Steve. 9 Annabeth Castronovo is a senior in Environmental Sciences. 10 August Dreyer graduated May 2022.

# TIM MEREDITH

INSTRUMENTATION SPECIALIST & COMPUTER SYSTEMS ADMINISTRATOR, PALEOMAGNETISM & GEOPHYSICS LABS



Although I have been a staff member of Geosciences for quite some time, this is my first contribution to our newsletter. My responsibilities focus on supporting faculty and students in the paleobotany and geophysics laboratories, providing administrative IT support, and maintaining the various field systems and equipment for both labs.

As we have slowly gotten back into field data collections, most of the efforts this year were centered on maintenance of the laboratory equipment. The paleomagnetometer is a very specialized item that is the core of operations in paleobotany and requires constant attention to software updates and hardware adjustments. Additionally, we have expanded our available computer terminals in the paleobotany lab to better support an influx of additional students.

In the geophysics lab we added several new computers to our internal network available for student’s research. We can tailor these systems to provide unique software platforms based on the unique requirements of each student. We also provide a display of seismic data in near-real time from several sensor emplacements in Dominican Republic, as well as other areas of the Caribbean.

Paleobotany and Geophysics provide a challenging and dynamic environment that provides a great opportunity to support the efforts of our students, faculty, and staff. As we go through the upcoming year, I’m sure we’ll have many exciting events to discuss in our next newsletter.





## DR. REN ZHANG

LAB MANAGER - STABLE ISOTOPE SPECTROMETRY LAB

Last year was my busiest year at Baylor, and I have successfully maintained smooth daily operations of the Stable Isotope Laboratory. In summary, I have made 5,574 isotopic analyses for both internal and external academic users and have generated over \$26K in annual revenue—both are new records for this lab. It is definitely not easy to achieve this, and many interesting things happened in this lab.

The most interesting story is about GasBench II: the same sampling problem came back again. No matter how hard I tried this time, I still could not fix the problem by myself. As I have not changed the two on-line water removal devices for over a decade, I suspected something might go wrong inside the devices. An onsite service visit was arranged with Thermo to solve the problem, and after we opened up the GasBench II unit, we found out that the hygroscopic Nafion tubing in one of the two water removals had a few dark clogged spots and became sinuous. To ensure a clear flow path, we decided to replumb the whole system. We also thought we should thoroughly clean the 8-port Valco valve. To do so, we had to remove all the connecting tubing from the 8 ports, disassemble the whole valve and take out the rotor—the whole deep cleaning process was really tedious. To avoid the two exit ports of the Valco valve easily getting dirty again in the near future, we re-arranged its flow configuration to let helium gas constantly flow out of the exit ports. After all the hard work we have done, the annoying sampling problem is eventually gone, and I thought this instrument should function well for quite a while. However, a month later, the attached acid pump for carbonate analyses was completely dead, and I had to install a new one—this is actually the third acid pump I have replaced for the GasBench II. Is this the end? I do not know yet. What can we expect from an aging instrument?

When I analyze bulk solid samples on the Costech EA, I always ask students to weigh enough but not too much mass of their samples for isotopic analysis. This is because we want to achieve instant and complete combustion of the samples for acquiring isotope ratios. If you put too much mass in tin capsules, you may end up with either overshooting problems (i.e., beyond the maximum detection limit of the MS) or long tailing problems (i.e., slow and incomplete combustion) as each run the amount of oxygen injected into the combustion tube is limited. If overshooting problems happens, I have to pause isotope acquisition and it will take me hours to pump the system down to normal level before I can resume the sample table. For samples with long tailing problems, the acquired isotope data are not trustable. I have encountered both problems for many times, but recently noticed a new mass jump problem that was also caused by overweight mass. When I was analyzing a batch of beach sand samples with similar organic contents, I occasionally observed abnormal high sample CO<sub>2</sub> peak messed with mass jump. Then I realized that combustion of more than enough organic carbon might produce high gas pressure, leading to a high flow rate and an early arrival of the sample CO<sub>2</sub> peak that may conflict with the timing of the mass jump. To solve this problem, I just need to slightly change the timing of the mass jump in isotope acquisition method. Isn't it quite easy?

Finally, I would like to thank all the people who have helped and supported this lab for the past year and look forward to working with you again in the coming year!

## POST-DOCTORAL STUDENTS



**CHELSEA ALLISON, PH.D.**  
*Volcanology and Petrology*  
Ph.D., Arizona State University  
Faculty Mentor: Dr. Kenny Befus



**SACHIN KUMAR, PH.D.**  
*Seismology*  
Ph.D., Indian Institute of Technology/  
Indian School of Mines  
Faculty Mentor: Dr. Jay Pulliam



**BRENDAN ANDERSON, PH.D.**  
*Invertebrate Paleontology*  
Ph.D., Cornell University  
Faculty Mentor: Dr. Elizabeth Petsios



**JON RICHEY, PH.D.**  
*Paleobotany and Paleoclimate*  
Ph.D., University of California, Davis  
Faculty Mentor: Dr. Lee Nordt



**DON HOOD, PH.D.**  
*Planetary Geophysics*  
Ph.D., Louisiana State University  
Faculty Mentor: Dr. Peter James



**JAMES THOMPSON, PH.D.**  
*Volcanology and Petrology*  
Ph.D., University of Pittsburgh  
Faculty Mentor: Dr. Kenny Befus



**SIFAN KORICHE, PH.D.**  
*Climatology and Paleoclimatology*  
Ph.D., University of Reading,  
United Kingdom  
Faculty Mentor: Dr. Daniel Peppe





## THE LATEST “GREEN MACHINE” IS A SILVER HYBRID!

WE HAVE COME A LONG WAY FROM THE GREEN MACHINE #1 – “A 1950 (OR ‘51) RETIRED AIR FORCE CHEVY CARRYALL.”

Although we think we purchased our most recent vehicle, “Yoda” (or ‘Yota) – a 2022 Toyota Highlander Hybrid – at a fair price, it was significantly more than the \$150.00 paid for the original “Green Machine” at a military surplus sale. However, we are also pretty sure “Yoda” will get better mileage – an estimated 36 miles to the gallon.

Both vehicles represent a critical commitment to field work and travel necessary for research and teaching. We are blessed to have vehicles for travel to meetings with colleagues and students as well as vehicles that can access remote sites and haul essential heavy equipment. It is important to be able to travel and exchange ideas with colleagues and students, but it is essential for geoscientists to “go to the mountains” because it is impractical to bring the mountains to us.

Department vehicles like “Yoda” and the “Green Machine” allow students and faculty to expand horizons efficiently with flexibility to adjust for weather and schedule changes. Although the original “Green Machine” was almost 15 years old when it was retired, we now rotate our vehicles for safety reasons on a 10-year replacement cycle. Vehicles beyond 100,000 miles are replaced as soon as practical.

Probably no other equipment is as critical to geoscience as something that can take geoscientist to the field. It speaks well of our department that we tried to be fiscally responsible with a higher mileage vehicle for “lighter” jobs to offset the lower mileage of vehicles needed for “heavy” jobs like pulling a drilling rig or trailer and that we considered the environmental and climate impacts of our vehicles too. We hope “Yoda” will help.

*Background information on the “Green Machine” came from “Notes on the History of Geology at Baylor University from 1845 to 1992” written by the late professor Dr. O.T. Hayward in 2000.*

## DEPARTMENT NEWS



**DON HOOD, PH.D.**

Ph.D. – Louisiana State University

Postdoctoral researcher in Planetary Geophysics with Dr. Peter James

Don recently published *The Martian Boulder Automatic Recognition System, MBARS* in AGU’s Earth and Space Science. Mars is littered with large boulders, most of which are the result of the many impact craters that dot its surface. These boulders can stay at the surface for millions (maybe billions) of years, and so they are important recorders of surface processes like erosion and glacial activity. Thanks to high-resolution images from the High-Resolution Imaging Science Experiment (HiRISE), we can image these boulders directly and measure their size and location to learn about these surface processes. However, one problem remained: a single image can contain tens of thousands of boulders, far more than can be practically measured by a human team. That is why we developed the Martian Boulder Automatic Recognition System (MBARS) to automatically count boulders in these images and provide maps of their size and shape. With these maps, we can study entire boulder fields, learning more about the sources of the boulders and what processes affect them as they sit on the surface. We can also use these maps to explore areas where rovers or humans may explore in the future, identifying hazardous areas where it may be unsafe to land or drive.

MBARS is an open-source code, made available via github at:

<https://github.com/dhood14/MBARS>

<https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2022EA002410>



FOR THE LATEST BAYLOR GEOSCIENCES NEWS VISIT:

[www.baylor.edu/geosciences/news.php](http://www.baylor.edu/geosciences/news.php)

### SOCIAL MEDIA LINKS

 @baylorgeosciences

 @baylorgeosciences

 @baylorgeo



DECEMBER 2021 GRADUATES

BACHELOR OF SCIENCE IN GEOPHYSICS

AUDRA A. HOOVER

MASTER OF SCIENCE IN GEOLOGY

HOBART, KATE (MS)

Selecting Locations for Future Geophysical Surveys in Search of the Dog Valley Fault Using Earthquake, LiDAR, and GPS Data

ADVISOR: DR. VINCE CRONIN

COMMITTEE: DR. JOHN DUNBAR, DR. JOSEPH WHITE

DOCTOR OF PHILOSOPHY

THANGRAJ, JOSEPH (PHD)

Extraction of body wave arrivals from seismic interferometry using machine learning methods, with applications to seismic tomography

ADVISOR: DR. JAY PULLIAM

COMMITTEE: DR. JOHN DUNBAR, DR. PETER JAMES, DR. DAVID KAHLE, DR. MRINAL K. SEN

MAY 2022 GRADUATES

BACHELOR OF SCIENCE IN GEOLOGY

AUGUST DREYER

Senior Thesis: Groundwater Sustainability Assessment for Rural Homeowners

ADVISOR: DR. JOE YELDERMAN, JR.

MASTER OF SCIENCE IN GEOLOGY

DAWSON, CLAUDIA (MS)

Groundwater/ Surface Water Interactions; Gravel Pit Lakes in the Brazos River Alluvium Aquifer

ADVISOR: DR. JOE YELDERMAN, JR.

COMMITTEE: DR. STEVE DWORKIN, DR. TJ GEIGER

GYGI, DANIEL (MS)

Early Paleocene Plant Community and Paleoclimate Reconstruction of the Nacimiento Formation from the San Juan Basin, New Mexico

ADVISOR: DR. DAN PEPPE

COMMITTEE: DR. STEVE DWORKIN, DR. JOSEPH D. WHITE

PRICE, NICOLE (MS)

Paleogene climate reconstruction using paleosol mineral assemblages, San Juan, New Mexico

ADVISOR: DR. STEVE DWORKIN

COMMITTEE: DR. DAN PEPPE, DR. KEVIN KLAUSMEYER

SOARES, TOLUWANI (MS)

Modeling Macroalgae Growth to Optimize Biomass Production

ADVISOR: DR. JOE YELDERMAN, JR.

COMMITTEE: DR. JAMES FULTON, DR. THAD SCOTT



VISY, JULIA (MS)

Stratigraphic Partitioning and Reservoir Distribution of the Late Devonian to Early Mississippian Exshaw Formation, Western Canada Sedimentary Basin

ADVISOR: DR. STACY ATCHLEY

COMMITTEE: JAMES FULTON, PH.D., AND STEVE L. GREEN, PH.D.

MASTER OF ARTS IN EARTH SCIENCE

ELISABETH RAU

BENJAMIN O. SADLER

ZEQUN WU

DOCTOR OF PHILOSOPHY

MILLIGAN, JOSEPH (PHD)

Plant cuticle as a proxy for paleoecology and paleoatmospheric composition: modern calibration and application to the early Paleocene of the San Juan Basin, New Mexico

ADVISOR: DR. DAN PEPPE

COMMITTEE: DR. ELIZABETH PETSIOS, DR. WILLIAM HOCKADAY, DR. JOSEPH WHITE, DR. RICH BARCLAY, DR. REGAN DUNN

AUGUST 2022 GRADUATES

BACHELOR OF SCIENCE IN GEOLOGY

SHERIDAN SEELSON

MASTER OF SCIENCE IN GEOLOGY

DAME, RUDGER (MS)

Gravitational Indication of Subduction on Venus

ADVISOR: DR. PETER JAMES

COMMITTEE: DR. JAY PULLIAM, DR. KENNY BEFUS, DR. YANG LI, DR. SUE SMREKAR

MITCHELL, CHRISTOPHER (MS)

Impact Induced Porosity of Terrestrial Impact Craters: A Gravity Study of Meteor Crater

ADVISOR: DR. PETER JAMES

COMMITTEE: DR. JAY PULLIAM, DR. JOHN DUNBAR, DR. DAVID KAHLE

DOCTOR OF PHILOSOPHY

RAU, ELISABETH (PHD)

Application of Machine Learning and Magnetotellurics to Aid in Subsurface Characterization of Petroleum and Geothermal Reservoirs

ADVISOR: DR. STACY ATCHLEY

COMMITTEE: DR. STEVE DWORKIN, DR. JAMES FULTON, DR. JEFF DONAHO, DR. KATHY BREEN



Dr. Joseph Thangraj and Dr. Jay Pulliam at the December 2021 commencement.



# STUDENT AWARDS, SCHOLARSHIPS, AND GRANTS



**NATHAN WRIGHT, PhD Student, Awarded Two External Student Grants**

Nathan Wright was awarded the Paleontological Research Institution's (PRI) student travel award of \$500 to support travel to PRI in Ithaca, NY, for fossil collections-based research. This will be supporting work for Nathan's dissertation chapter titled "Phanerozoic Trends in Host Preference, Frequency, Distribution, and Ecology of the Rogerella Barnacle Tracemaker". He will be conducting a survey of marine invertebrate fossils in the collections for the presence of the trace fossil Rogerella.

The second grant Nathan was awarded is the NSF/GSA Graduate Research Award of \$2500 to support his dissertation research titled "Assessing the Impact of Crustacean Trace-producing Parasites on Preservation of Decapod Hosts using Experimental Taphonomy". Nathan will be traveling to St. Petersburg, FL, to conduct experiments in Tampa Bay using the facilities at the Florida Fish and Wildlife Conservation Commission.

**AUGUST R. DREYER**

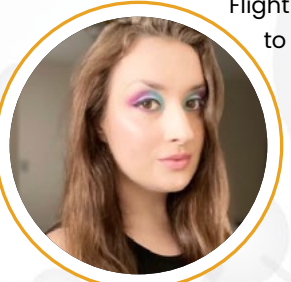
Robert T. Hill Award for Academic Excellence in Geology.

**MEGAN N. LEVER and TRENTON H. MEIER**

Represented the Geosciences Department at the spring 2022 College of Arts & Sciences Honors Convocation.

**ALYSSA MILLS, PhD Student working with Dr. Peter James, was recently awarded the John Mather Nobel Scholar Award**

for her internship at the Goddard Space Flight center. This is a prestigious award given to only 8 interns/early career scientists.



**Baylor University Ph.D. graduate student, ALIX FOURNIER, received a GSA Graduate Student Research Grant**

Baylor University Ph.D. graduate student, Alix Fournier, received a GSA Graduate Student Research Grant to support her dissertation research. The goal of these grants is to support graduate students research projects in any field of the Geosciences. Alix was granted \$2000 to support her project "Interrelation between late Quaternary geomorphic and hydrologic processes for the evolution of Monahans and Kermit dune fields, West Texas, USA". The objective is to understand the relationship between perched aquifers hosted in Monahans and Kermit dune fields and dunes' height and morphology, as well as the origin and recharge mechanism of these aquifers.

**BEN SADLER, Geosciences Ph.D. student, awarded a scholarship from Fort Worth Geological Society**

Ben Sadler, Geosciences Ph.D. student, received a scholarship from the Fort Worth Geological Society in recognition of his research and scholastics. He attended their lunch meeting at the Fort Worth Petroleum Club on May 10, 2022 and gave a presentation on his current research, which is focused on using seismic methods to model deep crustal and lithospheric structure in Texas and the American Southwest, with a focus in the Permian Basin.

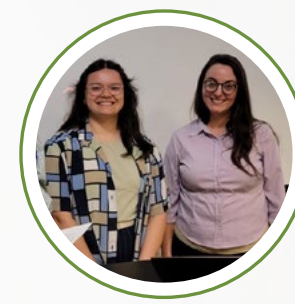


**TOLUWALEKE AJAYI, Geosciences Ph.D. student, awarded the E. Russell Lloyd Memorial Scholarship**

Toluwaleke Ajayi, Geosciences Ph.D. student, was awarded the E. Russell Lloyd Memorial Scholarship from the West Texas Geological Society (WTGS) Scholarship Committee. The award was based on Toluwaleke's course of study in earth science, the desire for higher education, and need. The competition was intense, and Toluwaleke was commended for his academic achievements, extra-curricular activities, and determination. Toluwaleke is from Nigeria and is studying hydrogeophysical applications to karst aquifers with Dr. Joe C. Yelderman Jr. Congratulations to Toluwaleke and thank you to the West Texas Geological Society for their support of geoscience students.

**Graduate Student, DES THORNE, receives Dallas Paleontological Society Scholarship**

Des Thorn was awarded the Dallas Paleontological Society Frank Crane Memorial Scholarship for 2022 to support her MS thesis research, "Using Sycamore leaves to reconstruct ancient light environments". The award is presented annually by the Dallas Paleontological Society to graduate students from paleontology programs in Texas, and is designed to support the paleontological research of graduate students. Des will be conducting research on modern Sycamores grown in different light conditions at the Waco Wetlands and on fossil leaves collected from the San Juan Basin in New Mexico.



**Congratulations to PhD student, DAVA BUTLER**

Congratulations to Dava Butler who submitted and was awarded a grant on the behalf of the Waco Mammoth National Monument for a 2022 National Park Foundation (NPF) Service Corps Grant for the project, Saving the Waco Mammoths from a Second Extinction: Protecting a Scientifically Invaluable Resource Through Erosion Mitigation.

Waco Mammoth National Monument, Texas, was designated as a National Monument in 2015 to preserve and protect the "Nation's only recorded discovery of a nursery herd (females and offspring) of Pleistocene mammoths," as well as related objects of scientific interest located within the park. As part of this mission, the park preserves several known, unexcavated fossil deposits, which likely contain mammoths, camels, and other Ice Age fossils. Recent extreme-weather events, driven by climate change, have damaged and destroyed Waco Mammoth's fossil resources. A dry creek bed, which fills with runoff during storms, cuts through one of the Monument's fossil deposits. As a result, scientifically important fossils have weathered out of embankments on either side of the creek. In addition, erosion undercuts trees growing at the top of the embankments, which has caused several trees to fall. This blocks access to the deposit for scientific assessment, and it also creates a hazard to park staff. Staff from the City of Waco and Baylor University, acting in their role as park partners, covered one high-erosion area with a plastic tarp in 2016. Further maintenance was deferred to the Park Service. On recent inspection, NPS staff discovered the tarp has dry rot, and erosion of the embankment has resumed. As a new unit of the park system, the Monument has limited infrastructure and a small NPS staff (two full-time, non-maintenance rangers). Without the help of a service corps, the park is unable to take steps needed to prevent invaluable fossil specimens from being damaged or completely lost to science. By addressing deferred maintenance, this project will ensure the preservation of the park's fossil resources, provide for the safety of its staff, and procure tools for future preservation projects.



FAMILY CIRCLE



Congratulations to PhD student, Rebecca Taormina Childs, and husband, Brady, on the birth of their daughter, Bonnie Therese Childs, on November 5, 2021.

Congratulations to Dr. Peter James and his wife, Hannah, on the birth of their daughter, Lydia Marie James, on March 11, 2022



Sam Barber (MS, 2021) and family with new daughter, Hazel.

Anna Perry Banda (MS, 2007) wrote that she started a new position in September, 2021 with Azura Consulting LLC in Garland, Texas, as a Manager and Senior Scientist. Azura is a woman-owned small business that offers environmental consulting services focused on the research, conservation, and management of protected species, populations, and habitats.



Megan, a Baylor GEO and ENV alumnus, returned to Baylor on November 5, 2021, as Chief of Strategic Resources for the Bureau of Ocean Energy Management (BOEM), Department of the Interior. Megan received her Bachelor's (2002) and Master's (2004) degrees from BU (MS with Dr. Joe) and a Ph.D. in geophysics from the University of Tennessee. Thank you, Megan, for speaking to the Baylor Association of Women Geoscientists (BAWG) and others, but also for managing our nation's offshore resources. Sic 'em. (Dr. Megan Carr, Dr. Joe, and Dr. Pepper (floats) outside the Baylor Science Building.)



BAYLOR GEOSCIENCES  
ADMINISTRATION 2022-2023

DEPARTMENT CHAIR  
Dr. Joe C. Yelderman, Jr.

GRADUATE PROGRAM DIRECTOR (GPD)  
Dr. Jay Pulliam

UNDERGRADUATE PROGRAM DIRECTOR (UPD)  
Dr. Steve Dworkin

DIVERSITY AND INCLUSION REPRESENTATIVE  
Dr. Jay Pulliam

GRADUATE SCHOOL ASSOCIATE DEAN FOR

SCIENCES  
Dr. Bill Hockaday

DEAN OF THE COLLEGE OF ARTS & SCIENCES  
Dr. Lee Nordt

BGS/AAPG SPONSOR  
Dr. Stacy Atchley

BAWG SPONSOR  
Dr. Elizabeth Petsios

A SPECIAL THANKS TO  
Dr. Dan Peppe for serving 5 years as our GPD and to Dr. Bill Hockaday for serving as GPD for the Institute of Ecological Earth and Environmental Sciences.



Department of Geosciences  
One Bear Place #97354  
Waco, TX 76798-7354

Change Service Requested

## FACULTY

DR. STACY ATCHLEY  
*Professor*

—

DR. KENNY BEFUS  
*Associate Professor*

—

DR. STEVE DWORKIN  
*Professor, Undergraduate  
Program Director*

—

DR. STEVE FORMAN  
*Professor*

—

DR. JAMES FULTON  
*Assistant Professor*

—

DR. WILLIAM HOCKADAY  
*Associate Professor,  
Associate Dean for Research,  
Graduate School*

—

DR. PETER JAMES  
*Assistant Professor*

—

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