Change Service Requested

From the Chair
Dr. Stacy Atchley looks back at how far the Department has come.

Faculty
Dr. Stacy Atchley, Chairman & Professor
Dr. Peter Allen, Professor
Dr. Kenny Befus, Assistant Professor
Dr. Vincent Cronin, Professor
Dr. Steven Driese, Associate Dean for Research, Graduate School & Professor
Dr. John Dunbar, Assistant Professor
Dr. Steve Dworkin, Professor & Undergraduate Program Director
Dr. Jay Pulliam, WM Keck Foundation Professor of Geophysics
Dr. Joe Yelderman, Professor
Dr. Rena Bonem, Emeritus
Dr. Tom Goforth, Emeritus
Dr. Don Parker, Emeritus

Staff
Sharon Browning, Teaching Lab Coordinator
Wayne Hamilton, Program Consultant, Laboratory Safety Coordinator
Liliana Marin, Geoscience Instrumentation Specialist, Luminescence Geochronology Research
Tim Meredith, Instrumentation Specialist and Computer Systems Admin, Paleomagnetism and Geophysics Labs
Dr. Ren Zhang, Stable Isotope Mass Spectrometry Technician

Emeritus
Dr. Lee Nordt, Dean, College of Arts & Sciences & Professor
Dr. Daniel Peppe, Associate Professor & Graduate Program Director
Dr. Elizabeth Petsios, Assistant Professor

Admins
Paulette Penney, Office Administrator
Jamie Atchley, Administrative Associate
Jamie Ruth, Administrative Associate

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Dear Friends

Greetings from the Baylor University Department of Geosciences! Over the past 16 years, Baylor has engaged in several major initiatives from Vision 2022 in 2002, to Pro Futuris in 2012 and now Illuminate that have transformed our campus culture into one that emphasizes research excellence. During this transformation, the university has generously invested in both Geosciences faculty and their affiliated research facilities and equipment.

Since 2003, our faculty have grown from 12 to 18 and have also added 8 new laboratories and 3 full-time laboratory technicians (Figure 1A). From this investment, research productivity has dramatically surged. External funding has increased from approximately $300K/year in 2004 to greater than $1M/year in 2018 (Figure 1B). Faculty publications have increased from less than 1 per person in 2005 to almost 3 per person in 2018 (Figure 1C). And faculty conference presentations have increased from 2-3 presentations a year to 5 (Figure 1D). And faculty conference presentations have increased from 2-3 presentations a year to 5 (Figure 1D).

As we continue our transition to a research emphasis, so too does our faculty composition evolve. In Fall 2018, we welcomed Dr. Elizabeth Petasis (Ph.D., University of Southern California) to the Geosciences faculty. Dr. Petasis is an invertebrate paleontologist that specializes in the study of echinoderms. Her new laboratory space was completed in Fall 2018, and she's gaining momentum with both her research agenda and classroom preparations. Drs. Peter Allen and John Dunbar plan to retire at the end of the Spring 2020 semester after 41 and 25 years of faithful service, respectively. It’s worth mentioning that Dr. Allen was my Physical Geology professor in the Fall of my freshman year in 1979 and recruited me to change my major from Business-Law to Geology. Peter’s guidance had a profoundly positive impact on my life. I owe both a debt of gratitude.

A few highlights

2019
Logan West (Ph.D. student) awarded the Baylor Graduate School “Outstanding Dissertation Award”
Dr. Jay Pulliam awarded the 2018 Fulbright-Nehru Distinguished Chair Fellowship
Bubuli Ammed (Ph.D. student) awarded the 2019 Department of Energy Student Research Fellowship

2018
Dr. Peter James received the 2018 NASA “Group Achievement Award” for contributions on the MESSENGER spacecraft team
Dr. Steve Forman had several recent high-profile publications in Geology, Science Advances and Nature
Logan West (Ph.D. student) received the “Outstanding Paper Award” from Palaeo
Bart Yeates and Jiajun (Dylan) Jiang received the Spring and Fall 2018 National Association of Geoscience Teachers “Outstanding TA Award”

2017
Dr. Peter Allen received the 2017 “SeniorScientist Award” from the United States Department of Agriculture ARS

2016
Josh Brownlow and Stephanie Wong (Ph.D. students) received the 2015 and 2016 “Parrodeny Award” from the National Groundwater Association
Zach Valdes (Ph.D. student) received 1st place in the biomimicry systems poster competition at the 2016 Soil Science Society of America National Meeting

2015
Zach Valdes (Ph.D. student) was awarded an NSF Graduate Student Fellowship in 2015
Dr. Steve Driese received the 2015-2016 Baylor University “Outstanding Professor” award

2014
Michael Nguyen (Ph.D. student) was awarded an NSF Graduate Research Fellowship in 2014

2013
Dr. Stacs Atchley, Steve Deorlin and Lee Nordt received the 2013 “Outstanding Paper Award” from the Journal of Sedimentary Research

2009
Dr. Steve Driese was elected President of SEPM (Society for Sedimentary Geology) for 2009-2010

BAYLOR GEOSCIENCES
NEWSLETTER FALL 2019

COVER PHOTO OF A THIN SECTION OF OLIVINE

Figure 1. Measures of Geosciences faculty and staff growth and research productivity since 2003:

- **Faculty**: 12 in 2003, grew to 18 in 2018
- **Additions**: 8 new laboratories and 3 full-time laboratory technicians
- **External Funding**: Increased from $300K/year in 2004 to over $1M/year in 2018
- **Faculty Publications**: Increased from less than 1 per person in 2005 to almost 3 per person in 2018
- **Conference Presentations**: Increased from 2-3 presentations a year to 5

We greatly appreciate our loyal alumni and friends, and thank you for your ongoing care and support of our department.
Seems like the years have started blending together. But it’s still exciting to be involved with the students and new ideas. On the teaching front, I continue to teach Freshman Geology 1405 and then taught Hydrology for the last time. Yep, no more slopping around in the wonderful expansive clays of Ash Creek, or Wolman pebble counts… or cursing HEC-RAS. I have my last graduate student Sam Barber who is working on fluvial geomorphic project on the North Bosque River. Sam also has a grant to assess river erosion and deposition across the continental United States for the USDA/ARS so he is busy. We just completed a Kayak trip down the river and only tipped over one Kayak.

Research-wise, I continue to work with John Dunbar, Joseph White, and Jeff Arnold on both the SWAT model as well as on applied fluvial geomorphology projects throughout Texas. We just completed a project on flood hazard assessment and river corridor erosion with Halff Engineers on the Blanco River in San Marcos, and another on river erosion of about 45 homes in Coppell, Texas, also with Halff Engineers.

For the bean counters, I mean research, we put together about 4 papers on Hydrology over the last year, including one on headward gully erosion which is to be used in the larger SWAT model as well as in river erosion models by Lammers and Bledsoe from University of Georgia. Academic work also involved giving a Keynote Address to the Riparian Stream Conference in Gaylord, Texas and hosting Dr. Ryan Bailey from Colorado State for a talk in SWAT-Modflow. I attended the SWAT International conference in Belgium in September (below) and gave a presentation. We continue to have funding from the USDA for work on the SWAT model under Dr. Jeff Arnold and Dr. Mike White of the USDA/ARS.

It was an eventful Fall as my third daughter, Annabel (last wedding), was married in Tabernash, Colorado. A truly wonderful event. This year has been punctuated by trips to Denver to see daughter #2 and the two grandkids, and then to Dallas to see daughter #1 and grandkids. In between these trips, I sneaked up to Wisconsin to visit my 98-year-old mother and brother…both still feisty. Well, hope this year finds you all well and having a good time in the water and rocks. Best to all and come visit.


Left: The Atomium, a famous landmark in Brussels, Belgium. Photo by Mike Cattell.

Right: Wedding of daughter #3 Annabel (in white) with daughter #2, Maggie (in purple). Tabernash, Colorado, September 2018.
Greetings to my former students and friends. Next year will begin my 25th year of service to Baylor. Yes, 25 years! Given the perspective that time provides, I now reflect on all the positive aspects of my time at Baylor.

Of the positives, and there are many, the greatest, without question, is the students I’ve had the privilege to work with. This aspect of my Baylor experience has truly been the highlight of my career… and continues to be. It’s satisfying to mentor skills, concepts and work ethic that will assist in launching a successful career, but it’s even more satisfying to influence character and self-worth and cultivate relationships that last a lifetime. I always enjoy phone calls and visits from my former students to learn where life has taken them and the ups and downs along the way. So please, if you’re ever passing through Waco, do stop by for a visit. Nothing makes my day more than a drop-in visit from a former student.

Student updates
With students in mind, let me provide an update on my current crop. As I mentioned in last year’s newsletter, most of my students are engaged in various aspects of a regional study of the Late Devonian Duvernay Formation of Alberta, Canada. Students involved in this project include M.S. student Anna Thorson (B.S. Sewannee), Ph.D. student Bart Yeates (B.S. BYU, M.S. Baylor) and Ph.D. student Elisabeth Rau (B.S. Colorado State). Anna’s focus has been the regional sequence stratigraphy and exploration-scale geologic risk-assessment. Anna did an outstanding job on her thesis and she successfully defended in May of 2019. Anna graduated in August of 2019 and worked as a summer 2019 intern for Anadarko in Denver. Bart’s dissertation is co-advised with Dr. Jamey Fulton and addresses the controls on the origin, type and richness of organic matter within the Duvernay and its relationship to regional trends in thermal maturity and hydrocarbon yield. Bart worked as a summer 2019 intern for the Department of Energy in Corvallis, Oregon.

Elisabeth Rau transitioned from the M.S. to Ph.D. program during 2018 and is being co-advised with Dr. Scott James on a project where “machine-learning” will be used in the prediction of various rock attributes from well logs. Elisabeth worked as a summer 2019 intern for Matador Resources in Dallas.

Dr. Jamey Fulton and I also kicked off a study of the Late Devonian Exshaw Formation of southern Alberta during the Fall of 2018, and M.S. student Mason Frucci (B.S. University of Arkansas) is our first student on this project. Mason’s thesis will characterize the richness, type and thermal maturity of organic matter within the Exshaw.

Also joining my group beginning Fall 2019 will be M.S. students Madison Mood (B.S. University of Kentucky) and Julia Vite (B.S. Baylor University). Madison’s thesis will involve the stratigraphy, sedimentology and geochemistry of a Duvernay outcrop exposure near the Columbia Oilfield in Alberta, and Julia’s thesis will characterize the sequence stratigraphic distribution of rock attributes within the Exshaw Formation across southern Alberta.

Transition
In closing, I’d add that my intention is to transition from service as Department Chair back to my full-time role as faculty member at the conclusion of the Fall 2019 semester. I’ve been pleased to have assisted our departmental efforts as an administrator. Now I feel compelled to serve the greater-good by giving undistracted attention to our students.
In my research this year, I’ve focused on collecting crystal-scale datasets using sophisticated analytical facilities to better understand the how and why of volcanic eruptions. I’m not going to relinquish petrology or volcano science, but this year I did decide to add a new facet to my research program: the study of gems. I want to bring my high-tech analytical, petrologic experience to develop a rigorous gem science expertise. The same techniques that can be applied to quartz and feldspar will also lead to fascinating science advances when applied to important gemstone petrologic and tectonic questions. There is an opportunity to develop a premier gem science program at Baylor.

To realize this vision, I am creating content at the undergraduate, graduate, and professional level. The department will now be offering a new freshman-level course called “Gems and Gem Minerals.” I will use the course to teach optics, crystallography, and mineralogy under the umbrella of beautiful gem minerals. Each student will also be able to cut their own gemstone using one of our 10 faceting machines.

Roy Bassoo (below) is my first graduate student working to develop the gem-centric research program. He is studying “diamonds from the world’s last wild place.” That means he is using diamonds found in the Amazon jungle of Guyana to understand regional mantle processes and sediment transport from the Precambrian to the Holocene. I am actively recruiting other people to join me in this vision, at any level. Finally, I am developing relationships with the Gemological Institute of America to partner with us for additional professional training and assist in job placement.

A year of going on field trips to the top of Enchanted Rock and deep into the Amazon jungle. Getting featured on NPR. And making a dazzling new addition to our research program.
Dr. Vince Cronin

My year has been filled with contributing to a lab manual and encyclopedia, organizing the first-ever Geosciences and Society Summit in Sweden, and keeping a close eye on climate change.

Since the beginning of the year, I’ve been on a crushing treadmill that included completing an invited article about plate triple junctions for Eilam’s Encyclopedia of Geology (3rd edition) and surviving the relentless grind of being the editor and principal revision author of the new edition of the AGI/NAGT Laboratory Manual in Physical Geology (10th edition). The other end of that tunnel is still a couple of months ahead as I write this in late June 2019. The lab book is covered by an intricate web of non-disclosure agreements, so I will leave that for next year’s newsletter.

Student updates
I will join the rest of the department in welcoming Kate Hobart BS from Texas A&M to Baylor Geosciences in the fall. She will be working on her Masters degree, hoping to increase her knowledge of structural and engineering geology along the way. Kate might work to button-up our studies of seismogenic faults in the Truckee area, just north of Lake Tahoe in California. With assistance from John Dunbar and perhaps other amiable geophysics nerds, we hope to get a better idea of where the Dog Valley Fault is based on prior MS theses by Ryley Collins and I had a lot of good nerdy fun this past year, working on small research projects that yielded presentations at the spring (impressively close to the deadline) Ryley is now off to the University of Southern California, where she hopes to develop her knowledge of microstructures in rocks, California has much to offer a student of structural geology, ranging from exposures of structures that were active a billion and a half years ago to seismogenic structures that might knock your coffee cup off the table today.

Summit in Sweden
This other way thing that kept me hopping is helping organize the first Geosciences and Society Summit in Stockholm last March. This was principally sponsored by an alphabet soup of international geoscience organizations including AGU, GSA, AGU, the Geological Society of London, the Belin Centre for Climate Research at Stockholm University, International Association for Promoting Geosciences, Geology for Global Development, and others. Keynote speaker Jeffery Sachs of the Earth Institute at Columbia University summarized the essential role played by geoscience in helping human society to navigate the climate-water-energy-resource- global change basket of challenges that we face. Dave Cortes (Executive Director of AAPG) brought the perspective of an energy industry aware of the need for transition and looking for partners to help chart an achievable course toward a prosperous, healthier, and more sustainable future. A science teacher brought part of her high-school class with her to Stockholm to participate in the Summit, representing our future. Her students were forceful advocates for the better world they would like to leave for their descendants.

My contributions to the Geoscience and Society Summit are accessible via croninprojects.org/Ethics-AGU-GSS2019.

Climate change
If you’re as yet a novice in climate change, I suggest looking at these free resources from the U.S. Global Change Research Program in the Fourth National Climate Assessment.

Great challenges create great opportunities for those who have prepared themselves with the knowledge and skills needed to guide society toward a positive future.
Dr. Steve Driese

It's been another very busy year for me with teaching, research, and professional service.

Teaching
In fall 2018, I taught two sections of the graduate GEO 5990 “Seminar in Grant Proposal Writing”, which included 5 grad students from the Biology Department. In spring 2019, I taught GEO 5V90 “Seminar in Grant Proposal Writing”, which included 5 grad students, including the teaching assistants.

Teaching
In fall 2018, I taught a part-time appointment as Associate Dean for Research in the Graduate School. One of my main assignments is to oversee the start of a 3-Department “pilot launch” for conducting external evaluations of Baylor PhD programs, including the Geosciences Department. Overseas English language instruction (both speaking and writing) for international ESL graduate students was another priority.

Student updates
This was the year of my continued completion of PhD dissertations and of these same graduates securing faculty positions. Bill Lukens (2017) was headed to a tenure-track faculty position at James Madison University in Harrisonburg, VA, after completing a 1.5-year postdoc at the University of Louisiana-Lafayette. Logan West defended his PhD dissertation in May 2018 and in August 2019 started a tenure-track faculty position at Mansfield University in Mansfield, PA. Logan also won the Outstanding Doctoral Dissertation Award from the Graduate School for 2018-2019, representing the STEM area, which is quite an accomplishment.

Lyndsay DiPietro completed her PhD dissertation in September 2018 and has been working for the Baylor ATL and BIC programs as she seeks future academic employment. Yohan Letourmy continues his PhD research at Johns Hopkins, Nova Scotia, on the sequence stratigraphy and statistical analysis of periodicity of 100,000 of Carboniferous fluvial and paleosol strata. New PhD student Sarah Koglar arrived in 2018 and will conduct research on the effects of rising sea-level on Gulf Coast soils, starting at Aransas National Wildlife Refuge, and apply insights of these modern soil analog systems to interpreting paleosol “drowned” by rising sea-level in the rock record.

Papers and presentations
In late spring 2019, I completed an invited chapter for an AGU 100th Centennial Book Volume on the history of soils, weathering and climate change. Our chapter, “The impact of a 1500 year history of Earth history with Lee Nordt and Gary Stinchcomb as co-authors,” which was a monumental task. My own research continues to focus on intertropical glacial paleokarst and paleosol landscape reconstructions using fossil soils, or paleosols, as well as conducting studies of modern soil systems (especially Vertisols) to develop climate proxies and analogs of ancient soils. In 2018-2019, I published 10 refereed journal articles, with 2 for which I was the first author. I also made 6 professional presentations of my research (as first author) and was a co-author on 16 other presentations.

Family matters
During the summer of 2018, Maryland and I traveled to Knoxville, TN, which is our summer retreat from the Texas heat, plus a holiday gathering time with family. We vacationed in Guatemala for a week in August 2018 to visit daughter Mary Catherine and accompanied by our son Nathan. On the way home from Guatemala, I continue to enjoy the vibrancy of living downtown in our condominium. Mary Catherine continues with her part-time job as archivist for McMinn County Library and is active politically in McMinn County. Mary Catherine continues in the PhD program at Arizona State University, majoring in medical anthropology. She continued research in Guatemala during 2018-2019 working with various US medical mission groups serving indigenous highland people. Mary Catherine and I plan to make a trip to Spain in August 2019 in conjunction with the International Quaternary Conference (where I will present a paper) and add a 1-week family vacation with our children Mary Catherine, Trevor and Lindsay, and Nathan, visiting Barcelona, Madrid and other famous cities.

Left: A photo I took last summer while visiting Mary Catherine and Marylaine, in the Santiago Volcano while in a boat on Lake Conostoc. ▲

Visiting with our children Mary Catherine, Trevor and Marylaine, of the Waco home front, Marylaine and I continue a paper) and add a 1-week family vacation during 2018-2019 working with various US medical mission groups serving indigenous highland people. Mary Catherine continues in the PhD program at Arizona State University, majoring in medical anthropology. She continued research in Guatemala during 2018-2019 working with various US medical mission groups serving indigenous highland people. Mary Catherine and I plan to make a trip to Spain in August 2019 in conjunction with the International Quaternary Conference (where I will present a paper) and add a 1-week family vacation with our children Mary Catherine, Trevor and Lindsay, and Nathan, visiting Barcelona, Madrid and other famous cities.

Publications
Dr. John Dunbar

Reflections on a 40-year career bookended by geophysical field work with an optical surveying instrument.

The early years

John earned a MS in geophysics in 1979 from Virginia Tech, which involved collecting gravity and heat flow data along the Atlantic coastal plain. Then he worked on shear-wave and 3D marine reflection seismology at ARCO Research in Plano, Texas. From 1984 to 1989, he did his PhD at the University of Texas at Austin, which involved geodynamic modeling of continental rifting and analysis of passive margin subsidence. He developed one of the early finite element models capable of representing non-linear meso-scale, large strains within the lithosphere. He also made a trip to Antarctica to collect single-channel reflection and magnetic data in the Ross Sea, which was ice free for the first time (Figure 2). In the spring of 2019, John reviewed a paper that validated some of the ideas he proposed in his 1988 dissertation with deep reflection seismic data, which was satisfying. In 1988, John joined Shell Research in Bellaire, Texas, to apply his finite element model to petroleum applications. During his stay at Shell, he helped develop 2D and then 3D basin models that simulated large scale deformation, faulting, heating and fluid flow within basins.

Switching gears

During the early 1990s, John began looking around for a new challenge. He found that new challenge as an assistant professor of environmental geophysics at Baylor University in the Fall of 1994. At that time, environmental geophysics was a new sub-discipline. John knew little about it, but made the argument that all sub-disciplines of geophysics share a common set of tools. For that reason, a petroleum geophysicist could easily make the switch to environmental geophysics. It now knows this is not true. Some of the faculty apparently bought his argument, some thought his petroleum background would be more useful, and for others his name reminded them of the main character in the movie "Dances with Wolves", which was popular at the time. By the combination of these views, John managed to garner the most votes of among the candidates and was hired.

Building a program

John's first task as a new professor was to get a field program in environmental geophysics up and running to support 2D and 3D thesis projects. With the help of Peter Allen, he got a small University grant to rent a modern sub-bottom profiler. He and Allen used the rented system to collect a few lines of sub-bottom data in Lake Waco. They then used that data to support a successful proposal to the Texas Higher Education Board for funds to develop a new acoustic profiling system designed specifically for surveying water supply reservoirs. The engineering work was done by Paul Higley of Specialty Devices Inc. of Wylie, Texas. By the end of 1997, John and Peter were working on the topic of water reservoir sediment surveying. Over the next ten years they received sizable grants from the Texas Water Development Board, the Texas State Soil and Water Conservation Board, and the USDA, and adapted the system for use in small flood control reservoirs (Figure 3). Today, the modern version of the system is used by the Texas Water Development Board, the USGS, the USACE, and the USDA within the US, along with similar agencies throughout the world.

Mentoring PhDs

In the early 2000s, the emphasis of the department changed to our PhD program. John received his first PhD application from Sikiru Amadu who was interested in near surface electrical resistivity work. Together they spent Fall 2005 fixing the department's old resistivity system and used it to begin his studies. Sikiru's first paper on the seasonal variation in soil moisture within Vertisol soils came out in 2007 and he completed his PhD in 2009. Based on these results, John contributed to a successful, multi-PI proposal to the EPA to monitor the salinity distribution with Lake Whitney, Texas using a marine resistivity system purchased with EPA funds. John then used the results from the Lake Whitney project to support a proposal to the USDOE for the development of a system to search for sub-seafloor methane hydrate deposits in the deep (> 1km of water) Gulf of Mexico and a second successful proposal to use that system to monitor the evolution of sub-seafloor hydrate deposits over time. This work was done in collaboration with Paul Higley of Specialty Device Inc., Markus Lagmanson of Applied Geosciences Inc. of Austin, Texas, and workers at the University of Mississippi. The work produced a second PhD student, Tian Xu. John’s third and final PhD student, Bulbul Ahmmed, which he co-advises with Scott James, is on schedule to complete his degree in Spring 2020.

Looking back

John’s shifting focus throughout his career reduced his output of the normal metrics of academic success (papers and grants), but he was driven by a love of learning new things and conquering new challenges. Looking back on it now, he worked that way because he found starting anew every few years on different topics interesting and exciting. He is most thankful for all the wonderful people he has had the chance to work with, learn from, and teach and would not change a thing.
I’ve just returned to campus after teaching Field Camp and I am getting used to living in a house again. We had twelve enthusiastic students this year and my trusty teaching assistant was Will Brewer who is getting a Ph.D. under the direction of Joe Yelderman. Cold weather followed us for most of the class. We had particularly bad weather in Stanley, Idaho, where we encountered snow and temperatures in the low 20’s.

I have finished my first year as Undergraduate Program Director. The college of Arts and Sciences has instituted a new Core Curriculum for all its undergraduate students, and it will be interesting to see how this impacts the Geology students as well as the Department. It appears that our majors will have to take fewer foreign language courses and more upper-level geology courses.

I continue to work on the climatically controlled mineral assembles in soils and their use in reconstructing ancient environmental conditions. Lyndsay DiPietro and I presented some of the results of this research last November at the GSA meeting in Indianapolis. Two of my graduate students, Marilyn Wisler and Kent Ostman, are studying the geochemistry of the organic-rich Duvernay Shale in the Western Alberta Basin, and they are making good progress. The lab was very busy this past year because they were constantly involved in sample prep and analysis.

Katarena Shiner also contributed to the traffic in the lab. Katarena is a Master’s student studying the geochemistry of Belizean paleosols with the intent of untangling the effect that climate played on Mayan agricultural practices.

My Ph.D. student Cong Jin has made good progress on understanding the climatic significance of the isotope and organic geochemistry of preserved organic matter in petrified wood. His second paper should be finished soon.
It’s been another enlightening year at Baylor. Our research group has leaped forward on our research, educational, and scholarly activities.

Student research fruition

This has been a year of completion of student research with Kasey Boiles receiving her PhD in Dec. 2019. This accomplishment is followed by a post-doctoral research position in the dust climate group at Lamont Doherty Earth Observatory, Columbia University. Kasey has authored many significant papers on climate/landscape controls of the 1930s dust bowl drought and potential dust emissions. Dr. Logan Wiest, a post-doctoral research associate working on the sedimentary architecture of the Monahans Dune Field, with industry support, has landed a tenure-track position at his alma mater, Midland University in eastern Pennsylvania, near his family. We are proud of Logan for winning awards for the best paper from the Society of Economic Paleontology and Mineralogy and for Outstanding Dissertation Award from Baylor. Lastly, finishing PhD student Dr. Don Esker landed a tenure-track position at Marietta College, in Ohio. He brings deep knowledge and engaging enthusiasm for all animals large and small that want extinct for a new generation of students.

Dust and drought

Andly, dust and droughts continue to concern us with projected climate changes from rising concentration of atmospheric greenhouse gases, like carbon dioxide, and methane in the 21st century. As Texas and much of the central USA dries, dust sources will abound to create dust-landscape surfaces, many which were former dune fields in past millennia. To quantify dust emissions from landscape elements in collaboration with Prof. Mark Sweeney from University of Michigan, we are using her portable wind tunnel “funnels.” We have collected 500s of dust emission measurements and determined particle size changes before and after simulated dust storms. This data is the foundation of developing a dust-source model with future projected downglaucations, which will be integrated into global climate models.

Why do I care about dust so much? Because as the planet warms from anthropogenic-caused climate change, large areas of the USA will become much hotter and drier and an increasing source of dust. Dust is a health exacerbator and leads to heightened morbidity and mortality from cardio-pulmonary diseases. To this end, we are collaborating with National Jewish Health Center and the School of Public Health at Univ. of Colorado-Boulder to directly a dust emission model to potential health outcomes. We love our dust!

Our fascination with dust extends back to the Quaternary with research on eolian systems associated with the Pecos River in west Texas. And the Red River which straddles the Texas and Oklahoma border. In contrast, we are fortunate to have access to the Department’s core library of scientists who can conduct 20 m long, continuous cores from most dune surfaces. Dr. Logan Wiest has master’s the use of the Geoscope and has been instrumental in extracting cores from the Monahans and from the Red River dunes. Zaqun Wu, a PhD student, will base her research off these and more cores to better understand the interactions of Red River fluvial and eolian systems with late Holocene climate variability. The trio of Logan Wiest as a post-doctoral research scientist, and Tori Tew and Connor Mayhack as graduate students are analyzing and modeling the Quarteray eolian basin architecture near Monahans, TX using information from Geoscope cores and traps, with recovery length between 3 and 40 m. Bayou has unique capabilities in analyzing cores with an abundance of well-equipped laboratories for particle size analysis, environmental magnetics, stable isotopes, biomarkers, molecular stratigraphy, grain-mineralogy, radiocarbon sample preparation and luminescence dating. The timeline to discoveries is significantly shortened compared to other programs backcalculated to the depth and breadth of analytical facilities and knowledgable faculty. This is a golden age of discovery.

Mysterious mammoths

Don Esker is researching the lifeways and environmental changes for large mammals associated with the Monahans Dune Monument. Don has encyclopedia-esque knowledge in Quaternary paleontology and an insightful approach to his research. He has measured Sr,C and Sr isotopes from micro and serial samples of Mammoth teeth to elucidate the migration pathways and environmental conditions at and prior to demise of mammoths. His research is important to test the hypothesis if a megadrought caused the death of the Waco herd. Don is also working on mammoth ear that he and others collected with excavations at Hall’s Cave, near Kerrville, TX led by Prof. Mike Walters and crew from Texas A&M University. Hall’s Cave is one of the hidden gems on the Texas landscape which contains a nearly continuous record of Pleistocene mammals, big and small. Don is the go-to guy for bone identification and is tagging teeth of large and small mammals for Sr and O isotopes to discern where these animals came before their demise in or near Hall’s Cave.

Luminescence dating

A valuable addition to our research group is Liang Peng, a graduate student who has received a China Scholarship Council Scholarship for two years to study in the Geochronology Dating Research Laboratory as a joint PhD degree effort with the Institute of Geology and Geophysics in Beijing. Liang is a quick study, well-versed in modern laboratory protocols for modern and ancient materials. He has extensive field experience in the many active and stabilize dune fields that span northern China. Liang brings new rigor and computational expertise such that he has developed the first integrated OSL dating calculation platform, which is open source, and freely available to the global community. With his new quantitative insights, deep understanding of OSL dating and programming prowess, Liang has further advanced the science. We are fortunate to host this international visitor.

Our mission

A touchstone of our research group is embracing new ideas, concepts, analytical and numerical approaches and technology that challenge existing scientific dogma that often impeded the advancement of science. We are a group of forward thinking, always learning, from the faculty, post-doctoral scholars and students at Baylor, and with our valued collaborators just down the road at Texas A&M, Univ. of Texas, Rice University and Hewlett-Packard and other research institutions. We are proud to be part of an international research community where pluralism is respected and nurtured. All independent, critical and thinking researchers and students are welcome.

We believe that this ever-changing matrix of collaborations that spans biogeochemical sciences with diverse ideas, perspectives and expertise is a stimulating approach to prepare the next generation of scientists to face ongoing challenges in the energy sector, stewardship of the planet, and to insure the well-being of future generations. We welcome visitors, from alumni to potential students. We all have something to learn.
My second year as an Assistant Professor passed quickly as I continued developing my research program and teaching portfolio.

Research

Geosciences graduate student Sanjukta Dhar and Jingyu Wang from TEEE have been using the HPLC-MS system to study the biogeochemistry of phytoplankton pigments. I've been using it to study intact polar lipids in soil microbes and snow algae in collaboration with colleagues from University of Minnesota, Lufkin, and University of Pittsburgh, where I was invited to give a colloquium talk in Fall 2018. I have also been using the GC-IRMS to study intramolecular isopes on the pigment scytonemin, and I presented initial reports on this work at the Goldschmidt Conference and the GSA Annual Meeting in 2018. I have also been collaborating with Dr. Sascha Usenio and graduate student Farzaneh Mansour from the Environmental Science Department to develop methods for analyzing the isotopes of amino acids from whale earwax as a proxy for changing ocean biogeochemistry over the 20th-21st centuries. I presented in April 2019 on this methodology at the Workshop on Marine Organic Biogeochemistry in Delft, Netherlands.

Research travels in 2018-2019 included summer trips to the Core Research Centre in Calgary, Alberta in both 2018 and 2019. Along with Dr. Stacy Allchity and students from the Applied Petroleum Research Lab, we described core, measured elemental composition using the department’s handheld X-Ray fluorescence spectrometer, and took samples for organic geochemical analysis. This sampling supports a new research project on Late Devonian marine biogeochemistry connected to mass extinction that is being carried out by Microbial Biogeochemistry Lab students Mason Frucci and Sanjukta Dhar in collaboration with students in the petroleum group. I am also collaborating with Baylor archaeologists on the San Giuliano Archaeological Research Project in Barbano Romano, Italy, where I traveled in 2018 and 2019. This is one of the Baylor in Italy undergraduate summer abroad programs, and we are incorporating geochemical analysis of artifacts and soils into the study of human settlement and trade.

Teaching

I taught World Oceans and a new graduate course, Geobiology, in Spring 2019 and Global Biogeochemical Cycles in Fall 2018. All these were new preparations and kept me busy developing new lectures and labs. I enjoyed teaching these classes and look forward to maintaining them in regular rotation over the coming years. I am especially excited to be able to incorporate snippets of my own research into World Oceans and to be teaching graduate students from many different research areas in the Global Biogeochemical Cycles class. In the Fall 2018 class there were students from hydrogeology and hydrology, terrestrial paleoclimatology, organic-geochemistry, petroleum geology, marine biogeochemistry, paleoecology, and paleobotany. The Geobiology class had students working intensively in the lab on microbial colonization of land surfaces and soil growth under different conditions of nutrient limitation.

Lab researchers

Sanjukta Dhar joined the Microbial Biogeochemistry Group in August 2018 as a Ph.D. student. Before coming to Baylor, Sanjukta earned an M.S. in Applied Geology at the National Institute of Technology, Rourkela, India, where she worked on a project in the freshwater microbialites of Fayetteville Green Sandstone in the past year. We'll miss him as he moves on to medical school at Texas Tech. Mason Frucci successfully defended his undergraduate honors thesis, “A Comparative Analysis of Fecal Sterol Distribution to Investigate the Disappearance of Mestodon at the Pigeon Ladder Site,” in April 2019. Arham Siddiqui graduated in May as a University Scholar in the Honors Program. It was great having him in the Microbial Biogeochemistry Group for the past year! We'll miss him as he moves on to medical school at Texas Tech.

Sarah Catherine Weaver is an undergraduate research assistant in the Microbial Biogeochemistry Lab. She’s a University Scholar/Pre-Med student at Baylor and carries out many of the sample preparation and chemical extraction protocols used in our lab. Sarah Catherine traveled throughout Europe in Fall 2018 as part of the Baylor in Maastricht Program, and we were glad to have her back in the lab for Spring and Summer 2019.

Presentations


Publications


Left: Celebrating Arham Siddiqui’s thesis defense with faculty and graduate students. Left: Sascha Usenio, Dr. Bill Hockaday, Zhao Wang, Arham Siddiqui, Sanjukta Dhar, Burke Leonice, and Dr. Jamey Fulton.

References

I submitted funding proposals to the American Chemical Society Petroleum Research Fund, NASA Exobiology Program, and the Strategic Environmental Research and Development Program of the Department of Defense. The Microbial Biogeochemistry Lab was active as new graduate students began research projects and started increasing sample throughput on the mass spectrometers. The new instruments are a Thermo Fisher LTQ ion-trap mass spectrometer coupled to a Thermo Finnigan high performance liquid chromatograph (HPLC) and a Thermo Delta V isotope ratio mass spectrometer with a gas chromatograph front (and GC-IRMS) for analyzing compound-specific isotope ratios of carbon, hydrogen, and nitrogen. Molecular and isotopic data from these instruments are used to study paleoclimatology, geomicrobiology, ecology, and environmental change.
A fifth year of online classes. An update on solar cycle 25. And a summer full of Greene family gatherings.

Course updates
Summer of 2019 is the fifth year that GEOG 1300 World Geography has been offered online through the College of Arts and Sciences. Building on the success of the first four years, summer 2019 online classes were offered with an over-enrollment of 20 students in the first summer session and 25 students in the second. Demand for this course remains strong, with wait-listed students in both sections.

Don continues a busy schedule with four classes offered each semester, including freshman sections of World Geography and Earth Science. Adopting to curricular changes introduced by the College of Arts and Sciences, the academic year 2018-2019 saw a reduction in the variety of freshman courses offered by the Geoscience Department. In summary, both GEO 1408 Earth Science and GEOG 1300 are no longer offered as core courses in the College. While current enrollment in these classes remains strong, future enrollments remain uncertain.

Solar cycle 25
Don’s research interest in climate holds promise of a weakening in solar activity during solar cycle 25, beginning this fall and reaching a maximum in solar activity in 2025. According to the Space Weather Prediction Center in Boulder Colorado, cycle 25 will continue a weaker-than-normal solar activity which began in the early 1990’s. The solar physicists expect that a quiet sun will allow more cosmic radiation to enter earth’s atmosphere which in turn will increase cloud cover and reduce earth’s temperature.

Making memories
Don and Alison visited Oregon this year as their solution to escape the heat of a Texas summer. Don reported that the warm 95 degree temperatures of early June fell into the 60’s during their July visit with overnight lows down to a chilly 45 degrees. This trip included a family reunion with Don’s brother Dave and his family. This visit included lots of good conversation, great food, along with some healthy hikes into the wilderness. While the forests of Oregon provided a happy experience, there was also a great deal of geology to be appreciated as well. Don has included here a few photographs of places visited; memories of the summer of 2019.

Left top: A Greene gathering at Crater Lake with daughter Meredith, son-in-law Jose and 5 grandkids
Left bottom: A family gathering at brother Dave’s family retreat
Below: Don with granddaughter Julia James on a hike along the Rogue River
My eighth year at Baylor University was filled with teaching favorite courses and ample student accomplishments.

Student accomplishments

The proudest accomplishments of this year were, of course, those of my students. They are friends and neighbors of Baylor University.

Dr. Michael Nguyen, a former Baylor student, completed his Ph.D. in the Geosciences at University of Massachusetts. Mike followed his mentor and former Baylor professor, Dr. Boris Lau, to UMass. I remained actively involved as co-mentor of his dissertation - "Sorption temperature and the formation and stability of iron-bound soil organic matter". Mike is an assistant professor at Loyola University of Chicago's Arapee College for first generation college students.

Emily Blackaby, B.S. in Geology, constructed the best bachelor's thesis that I have participated in, "Pre-Depositional age of Organic Matter in Flood Deposits: Insights into the Timescales of Biogeochemical Processes". Emily was co-mentored by Dr. Steve Forman. She is currently pursuing a doctorate in molecular biogeochemistry at the University of Toronto, with Professor Myrna Simpson.

Former doctoral student, Dr. Todd Longbottom will be joining the same research group as a postdoctoral fellow. It's great to see our former students being "grabbed up" by such a highly-ranked international university!

Publications

This was my first full year at Baylor after taking a leave of absence to visit the Lunar and Planetary Institute (LPI) in Houston, funded by the prestigious Urey Fellowship. The LPI was founded by president Lyndon Johnson in 1968 to analyze the anticipated Moon rock samples returned by the Apollo astronauts, and it later morphed into the leading global institution for the study of our solar system. In my time at the LPI, I developed professional relationships and collaborations that will continue with my research efforts at Baylor.

This was also my first year teaching classes in the geosciences department. In the fall, I taught Exploration Geophysics 1 (a class I inherited from John Dunbar) and a new graduate seminar: Planetary Seismology. In the spring, I designed a new graduate Geodynamics course, which dealt with the forces at work inside solid planets. The Planetary Seismology seminar was particularly timely, with the successful landing of NASA’s InSight mission partway through the semester. This mission contains a seismometer and a heat flow probe, and it will produce data that is of interest to a couple of us here at Baylor. For the occasion of the InSight landing, I organized a watch party that was well attended by students and faculty alike (bottom left and bottom right).

I’m currently advising Christopher Mitchell, a master’s student who is studying terrestrial impact craters. His work is being facilitated by our newly acquired Scintrex CG-6 gravimeter, which can detect changes of the strength of Earth’s gravity as small as one part in a billion. Such changes occur whenever there is a concentration or deficit of mass underground. This instrument is a fantastic new weapon in our department’s technological arsenal, with applications in hydrology, exploration geophysics, and planetary science. This February, I went with Chris and another MS student, Tyler Leggett, to Meteor Crater in Arizona to do a gravity survey (top left and bottom right). This is the best-preserved impact crater on Earth, so it’s a great place to study how craters form. Chris worked this summer to reduce the gravity data that we collected.

I recently published a paper in Geophysical Research Letters about the biggest crater in the Solar System, the Moon’s South Pole-Aitken basin (below). The crater is about 2000 kilometers wide, roughly the distance between Waco and Washington, D.C. Even though it is so big, it’s on the far side of the Moon, so we can’t see it from Earth. This research project used data from NASA’s GRAIL spacecrafts to measure the subtle changes in the strength of gravity around the Moon. When we combined that with more data from the Lunar Reconnaissance Orbiter, we discovered that there’s an abnormally large amount of mass underneath the crater. One theory is that the metal from the asteroid that formed this crater is still buried deep in the Moon’s interior. This discovery received a great deal of media attention; I counted at least 100 articles about our research, from National Geographic, Sky & Telescope, CNN, ABC, NBC, Fox News, the Boston Globe, USA Today, Newsweek, and others!

One of the neat things about space research is that we can apply the exact same techniques here on Earth, such as our project at Meteor Crater. That’s why the theme of our research group is a quote from C.S. Lewis’s Mere Christianity: “Aim for heaven, and you will get Earth thrown in.” That quote is obviously intended in a spiritual context, but we like the double meaning of using space research to understand our own planet better.

Find us online
Web: baylorplanetary.com
Twitter: @baylorplanetary, @peterbjames
Dr. Scott James

Research leaves in Dublin and Los Angeles. Conferences in Austin and San Francisco. And a quick stop off in Hawaii.

Research
My fifth year at Baylor certainly was exciting and I write from my office at UCLAs Institute for Pure and Applied Mathematics (IPAM). In addition to standard research and teaching (Ecology in the Fall) I was fortunate to be awarded a Spring Research Leave, the first 10 weeks of which I spent at IBM Research in Dublin Ireland and the last 12 weeks at IPAM. IPAM is an NSF-sponsored research center that offers various workshops and programs. Last Fall, I applied for and was accepted as a Core Participant (here for the duration) in the “Geometry and Learning from Data in 3D and Beyond” long program. It is intensely mathematical with a focus on machine learning (artificial intelligence). There are six week-long workshops with seminars delivered by leading experts in the field of mathematical geometry and deep learning interspersed with open weeks where Core Participant self-organizes into working groups to teach each other the latest advances in the field (I am facilitator for a group on Network Architecture and Practical Matters). It is certainly like drinking from a fine hose, but perhaps more important than what I am learning are the relationships I am developing — certain to result in collaborations. My research involves various aspect of applied deep learning from land-use classification, to geologic facies identification, to national soil-moisture estimates, to keep beaching, to Chlorophyll-a forecasts from satellite images. There is enormous excitement around deep learning research and development and its application seems limited only by our imagination. Of course, I must caveat that it is not a panacea and often neglected is the significant effort (often 15% of project time) of developing and conditioning the required data sets.

As always, I want to extend a special thanks to my mentor Professor Joe Volderman for guiding me through this process as well as to Department Chair Stacy Atchley for his tireless support and encouragement.

Conferences
I was fortunate to attend several conferences this academic year. In July, I participated in the Earth Educators Rendezvous at the University of Kansas and SoPy (Scientific Python Programming) in Austin. I’m talking my age here, but in December I attended my 24th American Geophysical Union Fall Meeting where I shared poster and oral sessions on Renewable Energy: Marine, Wave, and Hydrokinetic.

Publications
I continue to hold a courtesy appointment in the Department of Mechanical Engineering so that I can publish papers in this field as well as in the geosciences. I published five papers related to topics in mechanical engineering [1-4]. In the geosciences, I published two manuscripts [5, 6]. Relative to my research in macroalgae (kelp biofuels), I published two conference papers at Oceans ’15. Currently, I have three other manuscripts nearly through the review process.

Student updates
My doctoral student, Jiachen “Dylan” Jiang enters his final year and continues research involved with deep learning approaches to identify faults and facies from geophysical data. After spending the Fall as a Core Participant at IPAM’s ‘Science at Extreme Scales: Where Big Data Meets Large-scale Computing’ Long Program, Katherine Breen continues developing deep learning to estimate soil moisture throughout the nation for use in crop-viability and flood-risk assessments. She will attend the long program on “Machine Learning for Physics and the Physics of Learning” this coming Fall (I’m envious). I encourage three other doctoral students: Bulbul Ahmed with Dr. John Dunbar, William Breuer with my mentor Dr. Volderman, and recently Elisabeth Rau with Dr. Atchley. Master’s student, Yosuke Saito is fitting his stride and half way through her master’s research related to simulating macroalgae biomass production for use as a biofuel. The weekly James Research Group meetings are enormously enjoyable for me. These are sessions where my students present the latest developments and breakthroughs in their research. As you can imagine, working with six graduate students keeps me on my toes.

Other highlights
I continue my service as Associate Editor for the journals Geophysical and the American Society of Civil Engineers’ Journal of Hydraulic Engineering and have started a three-year rotation with Water Resources Research. I am a top journal in hydrogeology. I am wrapping up my service on the international Electrochemical Committee where I serve as Shadow Committee Chair and Subject Matter Expert for the Global Marine Hydrokinetic industry tasked with developing the international standard that will facilitate licensing of marine hydrokinetic energy projects.

Island getaway
With Hawaii firmly entrenched as my favorite Island getaway, my beautiful girlfriend, Angie, and I spent eight days at Miyako Island on Maui. This summer we look forward to continuing our island tour on Molokai.

Publications

Dr. Dan Peppe

This past year has been a great one. I’m writing this from my field site on Rusinga Island in Kenya after an interesting day of collecting fossils and measuring and describing the Miocene volcanoclastic sequence.

Over the past year, I’ve continued as the Graduate Program Director, worked to maintain an active research program and made a few interesting trips for research and conferences. I continue to work on a variety of projects, including reconstructing the climate and environments of Miocene hominid sites in Kenya and Uganda, understanding early Paleocene ecosystems in the San Juan Basin in New Mexico, and developing paleoecological and paleoecological proxies that can be applied to fossil leaves.

Student updates

My research in East Africa is part of a larger collaborative research project focused on reconstructing the paleoenvironments of the early Miocene across East Africa. PhD student Aly Baumgartner is studying the fossil plant communities from one of the important fossil plant bearing formations on Rusinga Island. She and I spent time on Rusinga Island in the summer of 2018 making collections of fossil leaves. After our fieldwork, we spent time at the National Museum of Kenya in Nairobi working to identify and describe the plant species that we have found. Aly then spent about a month in Nairobi in January finishing these analyses. Her results document changing climate and changing plant communities through time, which is a very interesting result because the fossil ape and monkey communities are similar. She’ll be presenting the results of her work at GSA this fall, and is in the process of writing up her results to be one of the chapters of her dissertation. I expect we will have exciting results about her conclusions to share by the next newsletter! This summer, I’m back on Rusinga Island with collaborators from the University of Minnesota, Senckenberg Institute, and Baylor Geosciences PhD graduate Lauren Michel, who is an Assistant Professor at Tennessee Tech University. We’re working on an interesting question about the stratigraphic relationship of fossil sites, in addition to finding and collecting many fossil leaves and vertebrate material.

PhD students Andrew Flynn and Joe Milligan are both working on the early Paleocene project in the San Juan Basin in New Mexico. Andrew’s work has been focused on understanding the early Paleocene fossil floras. Interestingly he’s found that the floras in the San Juan Basin are much more diverse and made up of very different species than similar aged floras from other parts of North America, which was an exciting surprise. His results suggest that the plant community response to the Cretaceous/Paleogene extinctions was a lot more variable than we previously thought and the results of some of this work is currently in press at Paleobiology. Andrew has also been working to update our age model for the sequence using magnetostratigraphy. In May, Andrew and I, along with undergraduate Jeremiah Robinson spent a little over a week in the field measuring the stratigraphy and collecting paleomagnetism samples to finalize our age model. Joe is working to reconstruct shade cover and CO2 for the early and middle Paleocene using fossil leaves. He’s had some success so far and I expect we’ll have some interesting results to share next year. Over the past few years, BS graduate Greg Jiang has worked in my lab and helped out with all different types of research. This past year, he completed a BS senior thesis on the climate and ecology of the fossil plant communities from the San Juan Basin. Greg presented this work at GSA and at the URSA’s Scholar’s week, and did a terrific job both times. His work shows some very interesting patterns in climate and ecology, that we are working to combine with our other analyses of the Paleocene plant communities.

In addition to his work on the Paleocene flora, Joe has been running a really interesting modern growth experiment where we are growing sycamore trees in different shade conditions to determine if we can use changes in their cellular structure to reconstruct shade in the past. Thus far, his work indicates that there is a very strong response to shade in sycamores. We managed to get one year of growth on the trees and were hoping to wrap up this work this summer. Unfortunately, Lake Waico has flooded twice to more than 10 feet above the normal lake level, which has meant that the trees and the shade structures have been completely submerged under water. We’re hoping that the trees survived their last submergence, and perhaps we’ll be able to do some sampling of leaves this summer and fall.

I’m also excited to share that MS student Jenn Wagner completed her MS thesis on Paleomagnetism on a section of late Eocene sediment from central Texas and will be starting a PhD program at Berkeley in the fall. Her results indicate that there were major changes in the flora across the Paleocene-Eocene boundary in central Texas. She also traveled to the Florida Museum of Natural History to look at fossils from the Paleogene Gulf Coastal Plain from across the southeastern US. Interestingly, she found that there are many plant taxa in common across the Gulf Coastal Plain, which indicates that during the Paleogene there was an expansive tropical forest that extended much further northward than today. We are working to turn Jenn’s thesis into a manuscript that we hope to submit this summer.

Other highlights

In addition to my research, I’ve really enjoyed being the Graduate Program Director and getting a chance to interact with the graduate students in Geosciences. We have a great group of students, and I look forward to continue teaching and working with them in the future. We’ve been regularly updating our Facebook, Twitter, and Instagram pages with information about the goings on in the department, so please follow us! In fall 2018 we also launched an updated website for the department website (www.baylor.edu/geoScienc ies). If you haven’t already visited our page, please check it out!\n
Top: Aly Baumgartner and her field assistant Saleson on the top of Kameru Hill, Rusinga Island, Kenya after a long day of collecting Miocene fossil leaves.
Middle: Dan Peppe in the Campanian Fruitland/Kirtland Formation in the Bisti/De-Na-Zin Wilderness Area in New Mexico, USA during a Society of Vertebrate Paleontology fieldtrip led by Peppe and colleagues.
Bottom: Andrew Flynn collecting his last dissertation paleomagnetism sample in the San Juan Basin in New Mexico, USA in May 2019.
Last Fall, I submitted my first grant proposal as a faculty member to the American Chemical Society’s Petroleum Research Fund. No luck the first time around, but I am continuing to revise and reimagine the project with the help of Dr. Stacy Atchley to resubmit this fall. I am also developing another aspect of the same project to submit to NSF’s Sedimentary Geology and Paleobiology solicitation, dealing with paleoecology and macroevolution across the Late Paleozoic Ice Age in the fossils of the Fort Worth and Permian Basins. Renovations to my lab space wrapped up in my first few months here, so I’ve been able to get out there on the weekends and bring back buckets full of Paleozoic fossils for processing. The friendly people over at the Dallas Paleontological Society have been kindly showing me around the local fossil sites, and Dr. Rena Bonem has been sharing her wisdom as well. We are planning an outing to some local field sites this month.

I hired my former labmate and now collaborator, Dr. Jeff Thompson, as a postdoctoral researcher in my lab. He came to work here despite having a prestigious fellowship offer from the Royal Society of London on the table, which he postponed acceptance of, so that we were able to get some great collaborative work in the 6 months he had here. He vacated the position at the beginning of the Spring semester, and I am currently looking for a new post-doc to replace him. My recent trip to the North American Paleontological Conference in Riverside has led to some potential hiring leads.

In the Fall I had also attended the Geological Society of America’s national meeting in Indianapolis, where I was able to get the word out that I’m here at Baylor now and looking for students. I recruited two graduate students, who will be joining my lab this year. Cooper Mala noski, who just graduated with his Bachelor’s from SUNY Cortland, is coming to work with me this Fall as a Master’s student. He’s interested in paleoecology and taphonomy. My Ph.D. student, Megan Jacobs, is coming to work with me in the Spring semester, as she’s wrapping a Master’s degree from University of Portsmouth in the UK. She’s interested in evolutionary and ecological trends in the Cretaceous, which we have plenty of around here!

I have taught an undergraduate class as a faculty, when I taught a class of 60 students in Earth and Life History (GEO 1406). It was a lot of fun and very fulfilling, albeit also overwhelming at times. I started out the class with 3 Geosciences/Earth Sciences majors and ended the class with 10, so I’d like to think that some of the things I said during the course had an impact. I’m gearing up now to teach Invertebrate Paleontology in the Fall as well as a Paleobiology graduate seminar.

In more personal news, my husband and I bought a house in Woodway at the beginning of the year. We are working on renovations now, and are settling in to our neighborhood. All in all, it has been an excellent and exhilarating first year for me here at Baylor!
Dr. Jay Pulliam

We look back on a year with a DOE-funded project, collaboration with colleagues in the Dominican Republic, and visiting students. And we look ahead to a fall sabbatical in India.

Research projects

We are in the final stages of a project funded by the Department of Energy to develop an automated seismic processing system. In July 2017 we successfully tested a prototype of the system at the Soda Lake geothermal site near Fallon, Nevada. In May 2019 we tested the full system at San Emidio, Nevada. This project started with a small purchase of Raspberry Pi processors, using kick funds, in 2015 and has grown into an exciting opportunity to change how exploration seismology is conducted. The DOE grant supported two full-time graduate students and a postdoctoral researcher at Baylor, which greatly expanded our seismology group, but we mounted a field party of 17 for the 2019 field test. All but three members were affiliated with Baylor and the team included undergraduate and graduate students, faculty, technician Tim Meredith, and postdoc Diego Quiros.

In addition to the DOE project, my group maintains a collaboration with colleagues at the Dominican Republic’s national seismic network and the University of Santo Domingo, as well as with the Puerto Rico Seismic Network and the University of Puerto Rico, Mayaguez. We made a significant effort on short notice in the Dominican Republic in March 2019 to replace the GPS units at all of our seismic stations. Some poor programming on the part of our lab in the Baylor Science Building prior to deployment in Nevada.

Dr. Quiros was also the lead author on a paper in which we presented group velocity maps for Rayleigh waves in the northeast Caribbean computed from ambient noise. His results delineated, for the first time, the four distinct structural units that joined together to form the island of Hispaniola. Graduate students Joseph Thangnaj, Alden Nette, Debajeeit Barman presented their research results for the southern United States at the annual meeting of the Seismological Society of America. Debajeeit and Alden’s results were for group velocity maps from ambient noise using a novel implementation of “double beamforming”, to ensure accurate results, and P- and S-velocity models from tasmanian travel tomography, respectively. Joseph produced a 2D model for a transect across the Texas-Gulf of Mexico passive margin using a variety of complementary datasets. Their attendance at the meeting was made possible by kick funds. Alden also published a widely read paper in which he compared recent crustal models for the southern U.S., setting the stage for his models of the upper mantle in the same region.

Visiting students

Our group hosted two undergraduates from Colorado State University during the summer 2018, as interns, and a graduate student from Louisiana State University for the Nevada field test in May 2019. The undergraduates participated in a wide range of activities with our group, including field work associated with our seismic array test and various data analyses in the lab. One of those students was supported by the NSF, the other was by kick funds. We continue to recruit new graduate students with increasingly impressive abilities and credentials and all of our graduates continue to find good jobs immediately after graduation, despite a poor job market in the energy industry at present.

Fall sabbatical

I will be on sabbatical during the Fall semester of the coming year. I was awarded a Fulbright fellowship to conduct research in India with Dr. Mohit Agrawal, a former Baylor graduate student, at the Indian Institute of Technology Indian School of Mines. We will be studying the structure of the crust and upper mantle beneath northeastern India, where oblique convergence between the Indian and Asian plates produces complex tectonics. In a triangular region just a few hundred kilometers across at its widest, the Indian states of Assam, Mizoram, Manipur, Nagaland, and Arunachal Pradesh span the short distance between the collisional margin of the Himalayas and the Indo-Burman ranges, an arcuate mountain belt along the northwestern margin of the Indian Shield. Within this region lies the high Shillong Plateau (the site of the massive Assam earthquake of 1897), the Meil Hills, and the Assam Valley, created by the Brahmaputra River. The northern vortex of this triangle coincides with the eastern Himalayan syntaxis.

Debajeeit and Alden’s results were for group velocity maps from ambient noise using a novel implementation of “double beamforming”, to ensure accurate results, and P- and S-velocity models from tasmanian travel tomography, respectively.
Dr. Joe Yelderman

Dr. Joe and his hydrogeology students had another great year which included publications, presentations, acclimations, and graduations! There were also great projects, a wonderful field trip, and a fascinating aquifer test.

A new aquifer?

A personal highlight for Dr. Joe was introducing the Washita Prairie segment of the Edwards Aquifer into the literature. The Geological Society of America will recognize the Washita Prairie as an official source. Dr. Joe’s contribution is dedicated to his former student Stan Cannata (M.S. 1988) who was the first to study the Washita Prairie aquifer. Although the State of Texas still does not recognize the Washita Prairie as an official aquifer, it is now part of the Edwards aquifer literature. The Washita Prairie segment of the Edwards (Balcones Fault Zone) Aquifer (Yelderman, 2019).

Students

Jacob Jarvis. M.S. 2019, was immediately employed by Galder and Associates in Austin, Texas. While at Baylor, Jacob worked as an intern with the Southern Trinity Groundwater Conservation District and received the 2017 Elan Allen Field Safety Award. Compartmentalization in the Northern Segment of the Brazos River Alluvium Aquifer (Jarvis, 2019).

Erin Noonan (Figure 2). M.S. 2019, was immediately employed by Tetra Tech in San Antonio, Texas. While at Baylor, Erin received an award from the US Geological Survey through the Texas Water Resources Research Institute and received the 2018 Elan Allen Field Safety Award. Salinity in the Northern Segment of the Brazos River Alluvium Aquifer: A Hydro-Forensic Approach (Noonan, 2019).

Will Brewer (Figure 5), current Ph.D. student in the Institute of Ecological, Earth, and Environmental sciences, was a Co-PI on a grant with Logan Yelderman from Prairie View A&M University and received a Len Assente Scholarship as well as a Fanninstein award from the NGWA for his outstanding poster presentation at Groundwater Week in Las Vegas, Nevada, December 2018. Integrating Well Monitoring Technology, Education, and Psychology to Improve Water Management in a Groundwater-Dependent Community. Continuing to strengthen her resume, Stephanie Wong acquired a position with the Academy for Teaching and Learning at the psychology department. Logan and daughter-in-law Rachel, and granddaughter Elizabeth (2 yrs.) live in Buda, Texas where he is a product owner for MistraTech. Son Logan completed his third year as an assistant professor at Prairie View University in the psychology department. Logan and daughter-in-law Rachel Beth, grandson Bryce (5 yrs.), grandson Nolan (3 yrs.), and grandson Beaux (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 while attending Columbus Avenue Baptist Church with his loving wife of 44 years. The Yeldermans still live at 706 Woodland West, Woodway, Texas and visitors are always welcome.

Wayne Castell (Figure 3), newest hydrogeology student working with Dr. Joe, is an M.S. student studying the application of gravity and passive seismic techniques to further understand the Brazos River Alluvium aquifer. Wayne successfully defended his thesis proposal this spring and received the graduate field safety award from the Elan Allen Field Safety endowment and a Len Assente scholarship from the NGWA. This summer Dr. Joe had the privilege of mentoring Ashley McGl, a McNair Scholar, who will be working closely with Stephanie Wong in Salt Flat, AZ. Blue Hole (karst feature in Santa Rosa, Elephant Butte Reservoir, NM; Salt Flat, Mohavanas Sand Dunes, San Solomon Spring, Sonora Caverns, TX. Wayne Hamilton, research scientist and all-around hydrogeology sidekick, has been a tremendous help to students and Dr. Joe. Wayne helps with classes, field trips, equipment, and conferences. His presentation at Groundwater Week impressed the executive director of the American Ground Water Trust (AGWT), Andrew Stone, who invited Wayne to speak at the Texas Aquifer Conference on the Edwards aquifer springs below the dam (Figure 4). Another project with AGWT involved state-of-the-art acoustic monitoring devices attached to household wells. The monitors use machine learning to filter out the noise from pumping data transmitted through the cloud to determine accurate water levels in the pumping wells. In December 2018, Erin Noonan, Will Brewer, Wayne Castell, Wayne Hamilton, and Dr. Joe attended the NGWA Groundwater West in Las Vegas, NV. Dr. Joe combined the annual conference with an arid zone hydrology field trip including the following stops: Red Rock Canyon, Hoover Dam, Lake Mead, NV; Grand Canyon, AZ; Blue Hole (karst feature in Santa Rosa, Elephant Butte Reservoir, NM; Salt Flat, Mohavanas Sand Dunes, San Solomon Spring, Sonora Caverns, TX.

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In Fall 2019, I taught Invertebrate Paleo for the last time to a class of 23 students. Elizabeth Petsios will take over this Fall and should have a good group for her first class. The rain finally has slowed down for the summer so she can get out and see some localities to take the group to.

All quiet on the work front
My year was quiet and filled with scanning theses and papers on Jamaican reefs to send to the folks who are looking at the history of the reefs through time and for the Marine Lab to add to their digital library. Other than solving a few advisement problems as the College of Arts and Sciences changes to their new undergraduate core, nothing unusual has happened at school.

Adding to my pack
Lady Bug and I are still doing agility but I decided that we really needed 4 dogs, so I made the mistake of adding a puppy to the household in March. Nothing there has been quiet or routine since then. Jaeger is into everything. He is a Jagdterrier, which is a German hunt terrier, bred to hunt feral hogs. The puppy teeth finally came out this summer (he was born in January), so my arms are in better condition, but he needs to do something all the time and I cannot keep up with him. My walls and desk show signs of teething. At this point, he is as tall as Lady Bug but only weighs 16 pounds. He will start his first pre-agility class on June 24 and will be on track to take on the world as soon as he calms down a bit. 🐶

As always, if you're in the Waco area, be sure to come by and visit!
As we approach the implementation of the new Arts and Sciences core, my continued focus this past year was insuring we were ready for any challenges we encountered. Our freshman labs are a critical component of our department, both in recruiting potential geoscience majors and improving students’ scientific literacy. This will be the 1st time I have encountered such a significant change but continue to anticipate a great future for our department.

This past year also saw two of our graduate teaching assistants receive national teaching awards for their work in our freshman labs. PhD student Bart Yeates was awarded the National Association of Geoscience Teachers (NAGT) Outstanding TA award for June 2018, and PhD student Dylan Jiang received the award for January 2019. Each received a year’s membership in NAGT, including online access to the Journal of Geoscience Education and the quarterly In the Trenches magazine. Our department has an excellent group of teaching assistants, and I value their input and commitment to education in the classroom.

I also attended the 4th meeting of the Earth Educator Rendezvous in Lawrence, Kansas, in Summer 2018 at the University of Kansas. Designed to improve undergraduate education, this is a meeting of Earth science educators at all levels to discuss strategies, activities, and challenges in undergraduate education, as well as a variety of other educational topics. The suite of buildings where the conference was hosted boasts a courtyard consisting of 30 boulders of samples from around the globe representing 2 billion years of geologic history, and was a popular place to stroll during the conference.

Our department’s inaugural presence as an exhibitor at the American Geophysical Union meeting in Washington, D.C. this past December gave me the opportunity to both represent Baylor to potential graduate students and visit some the region’s history as well. My colleague Liliana Marin was a pleasure to work with, and seeing Space Shuttle Discovery (left and below) was a highlight of my trip!

Outreach Activities in 2018 included an invited talk and field trip with the Waco Master Naturalists. This is our 4th year to work with this excellent community group in their engagement with the natural world. I also visited the La Vega Elementary Geology Club, giving approximately twenty-five 5th grade students the opportunity to engage with geologic samples and our fluorescent mineral cabinet. The visit to South Bosque Elementary Midway ISD consisted of one hundred 3rd graders, a stream table video, topographic maps, and rock and mineral samples. I always enjoy the natural curiosity of younger students and their eagerness to learn. I also participated in National Fossil Day at the Waco Mammoth National Monument in October, along with our Baylor Geological Society and Melissa Mulinis of the Center for Reservoir and Aquatic Systems Research (CRASR). One of the activities utilized a portable stream table constructed by Baylor faculty member John Dunbar, which was gifted to the monument for future use.

A year of preparing for the new core, national TA awards, conferences, and outreach.
Wayne Hamilton

The following describes my work activities serving students and faculty in the Baylor Geosciences Department.

Teaching
I participated in Dr. Joe’s Environmental Geology class and observed how he organized and presented the material to a mostly non-major class. The class met twice a week and gave me interaction with the students and opportunity to discuss and support Dr. Joe’s teaching. When Dr. Joe was out of town, I was able to substitute teach and keep the class moving forward. Also, the day before the exams, I did an evening review session that the students attended. It was a fun group of students whom I enjoyed being with and watching them learn how Geology applies to their life.

In Dr. Joe’s hydrogeology and water management classes, I was able to contribute my environmental experience gained at Shell. Also, I treated and led several field labs. I find students like and learn from this opportunity to have class lectures enhanced with practical, hands-on field experience.

Presentations
In November at GSA 2018 meeting in Indianapolis, I made a presentation entitled “The Challenges and Successes in Preparing Students for the National Association of State Boards of Geology (NASBOG) Examination.” The presentation told of our experience preparing students to be Texas licensed registered Geoscientists.

Also, at the December 2018 National Water Well Association Conference, in Las Vegas, I delivered a presentation called “Training Future Hydrogeologists: A Repurposed Geoprobe to Assess an Alluvial Aquifer.” The presentation shared our experience being owner and operator of a Geoprobe to train future hydrogeologists.

Furthermore, Dr. Joe and I were requested to make the Geoprobe presentation again in Austin to the American Groundwater Trust conference at the June meeting. The presentation gave us an opportunity to showcase how we are educating the next generation of hydrogeologists in the Geosciences Department.

Department Support
The main focus of research activities was working with students Jacob Jarvis, Erin Noonan and Wynne Castile with the MS Thesis work. My goal was to help them work safely and effectively in the field as they acquired the research data for their MS thesis (Figure 2). I also assisted Dr. Joe with the safety and operations of the Geoprobe rig (Figure 5) to help the department conduct hydrogeology research. The Geoprobe provides excellent quality subsurface cores and water samples to support faculty and students research. Furthermore, I was able to refurbish and sell the 1995 SIMCO 2400 drilling rig and use the proceeds to maintain, repair and buy new tooling for our Geoprobe.

During the fall and winter, I participated with a group of geoscientists supporting state licensing of professional Geoscientists in Texas. The Texas Sunset Commission held hearings concerning keeping or abolishing the Texas Board of Professional Geoscientists. I provided Senate testimony from an industry and academic viewpoint supporting and justifying the state licensing of Geoscientists. The State of Texas passed HB 133 to continue licensing Professional Geoscientists for another six years.

Knowing the importance of administrative activities that support the Geosciences Department, I assist with two areas. First is with departmental vehicles utilization, such as annual registration stickers, maintenance and repairs. This allows our faculty and students to get to the field and experience firsthand understanding of geology. Second is helping with laboratory and general safety support. This included monthly audits that are compliant with Baylor’s BioRAFT safety program.

Personal
Our first grandson was born to our daughter October 19, 2018 in Dallas Texas and is named Luke Allen (Figure 3). What a joy to be near enough to babysit Luke and interact with the parents. My wife and I have been enjoying our semi-rural living on two acres in a ranch-style house in Lorena, Texas. This year we’ve upgraded our windows and added a patio. I enjoy the yard work such as cutting the grass, spreading compost and trimming trees—and how satisfying to see a great-looking yard after the effort.

I’ve developed a recent love for American Civil War and Texas history. This year I visited civil war battlefields in Richmond, Va, and Gettysburg, Pa plus went to the Texas General Land Office to see maps of the Republic of Texas. I also visited the Circuit of the America sports car racing track (Figure 6). My love of cars is a holdover from my teenage years, so it is fun to rekindle and explore again a passion for cars. The rumbling sounds and fast speeds are exhilarating and makes me feel young again.

I’m grateful for this second career I’ve had at Baylor, and look forward to continue serving the students and faculty.
About the lab

The Baylor Geoluminescence Dating Research Lab hosts a dozen scientists and students engaged in active research. Here's an update on what we've been working on this past year.

Along with the coordination of the lab, I have taught for the past 4.5 years the class Geology 1401 Earthquakes and Other Natural Disasters. I continue cherish this opportunity to maintain my connection with pedagogy and to keep up-to-date with teaching strategies that enable students to succeed in introductory science classes. The small class, 30 people, allows to establish closer academic connections with the students, which translates into better student performance.

Beyond the extra-curricular and lab activities, there are two worth mentioned this year:

1. I participated as a Baylor exhibitor at the AGU Fall Meeting 2018, in Washington D.C. in December 2018. Baylor’s booth was visited by tens of prospective students, as well as alumni and friends.

2. I attended the EU-In-Time RSWorkshop on Geochronology and Mars Exploration held at the Jackson School of Geosciences, at the University of Texas at Austin in April 2018. This workshop brought together international geologists, engineers, students, planetary and terrestrial scientists to explore the geochronology of Mars from various perspectives. The generation of absolute ages in Mars deposits is paramount to decipher the geological processes and history of climate evolution of the planet. Dr. Forman was invited to give a talk and the group participated in round tables and discussions about the feasibility of generate OSL ages for the planet.

Dr. Logan Wiest from Baylor University works as a post-doctoral scientist as part of the research group including Steve Forman, Connor Mayhack, Tori Tew, and industry-based geologists to gather stratigraphic and chronologic data to model better complex depositional architecture for the Monahans eolian system.

Xiaohua Quo was a shared graduate-student in the lab for four years. After her PhD graduation in China, she returned as a post-doctoral scientist co-authoring a paper published in the Geochronometry Science Reviews, about the episodic nature of tectonics formation and incision rates, as a proxy for regional tectonic uplift of the Yellow River over the past 1.8 Ma. At the end of the summer 2018 she returned to China, where she became a professor at Shandong University of Science and Technology, one of the largest universities in the country.

Liang Peng, a PhD student from the Institute of Geology and Geophysics in Beijing, has been in the lab for a year and a half, thanks to the two-year China Scholarship Council award. His research interests are in understanding the evolution of deserts and mechanisms of sand deposition and aridification. His PhD research focuses on understanding the timing and causes of landscape instability and broader denudation for Hunan-Bur Sandy Land in, northeast China. Currently, he is co-authoring a paper that introduces a novel field and geochemical method to characterize the evolution of sand dunes and sand deposits.

The Geoluminescence Dating Research Lab is a joint research effort between Baylor University and the Monterey Shale Research Institute. The lab has been awarded with grants and research contracts from USGS, NSF, and other federal agencies. The lab is also home to some of the most advanced research equipment in the field of geochronology, including OSL, TL, and lutetium-oxide (Lu-OSL) dating.

One of the lab’s main focuses is on understanding the timing and processes of sedimentary and geologic events. The lab has conducted research on a variety of topics, including the timing of sand dune formation and the evolution of deserts. The lab has also conducted research on the timing of tectonic events, such as the uplift of the Tibetan Plateau.

The lab is also home to a number of talented and dedicated students and researchers. Among them is Dr. Logan Wiest, who has taught for the past 4.5 years the class Geology 1401 Earthquakes and Other Natural Disasters. Dr. Wiest has been an invaluable member of the lab, and his contributions have been instrumental in advancing our understanding of the geologic processes that shape our planet.

The lab is located in the heart of Baylor University’s campus, and it is easily accessible to students and visitors. The lab is equipped with state-of-the-art research equipment and facilities, and it is staffed by a team of dedicated researchers and students.

We host a learning community where we all support the students’ educational and personal needs, and help the students balance academic, family, and individual demands through the semester. We emphasize the need to pursue pluralistic knowledge in environmental dosimetry, solid-state physics, climate change, sedimentology, and mineralogy. We also guide students to sharpen critical thinking skills, to execute safe lab procedures, and to develop better time management.

Research is not a singular task, but a collaborative venture in which we depend on each other. Our students' contributions are respected and are important to move the science forward. Our goal is to encourage greater intellectual engagement and scientific curiosity for undergraduates to give them added impetus to seek graduate studies.

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Last year was my ninth year at Baylor, and I have successfully managed normal operations of the Stable Isotope Laboratory and have supported both Departmental stable isotope course and many ongoing internal and external research programs by providing 4380 high-quality isotopic analyses. In addition, I have generated more than enough funds to cover daily operation cost of the lab instruments. Again, our aging analytical system experienced many operational difficulties, and I had to spend quite a lot of time fixing them. Here are some examples different from previous years.

Rising temperatures
First, I have experienced many abnormally high lab room temperatures for the past year. We all know that a Mass Spectrometer (MS) needs to be operated in a cool environment to avoid premature failure of transistors and integrated circuits. The proper temperature range for MS is 15-27°C, the optimum operation temperature is 18-21°C, and a ±2°C/day fluctuation is allowed. Our lab room temperature is usually kept between 21 and 22°C. However, sometimes the AC system was not working properly due to some reasons (e.g., chill water leaking, AC distribution box problem, maintenance, power failure, etc.), and lab room temperature occasionally could climb above 25-27°C. There was very little I could do when this happened; I had to stop isotope acquisition, open the lab door, use portable fans to cool the MS, and let cold tap water run. In the worst-case scenario, I was forced to completely shut down the MS.

When in doubt, restart
Second, the MS could also be involuntarily shut down either by power outages or by loss of compressed air, and this happened four times last year. Every time I had to restart the MS, it could take days to pump the system down to normal background, and I might need to bake out the MS to achieve this. In addition, the MS further needed to be tuned and calibrated before analyzing the loaded samples for their isotopic compositions. The most recent power outages just occurred in the morning during isotope acquisition stage and shut down the whole analytical system. As a result, I lost the isotope data of the sample that was being analyzed. After the power was restored, I could turn on all the instruments except the computer—it refused to re-start. I called Baylor Computer Help Line, talked to two specialists, and tried different methods to re-start the computer, but all didn’t work. The problem was solved by a Baylor IT technician who arrived at the scene around 3:00 pm and re-set the two memory cards of the computer.

Opening up the pump
Third, I have thoroughly cleaned the clogged acid pump head for the first time, which could significantly extend its lifespan. The acid pump provided by the Thermo for analyzing carbonate samples on the Gas Bench II is originally not designed for moving concentrated phosphoric acid with a high viscosity. As a result, the concentrated H3PO4 tends to crystallize inside the pump head under the pressure. If you don’t remove the crystallized phosphoric acid from the clogged parts on a regular basis, the pump would stop working after a short while. The whole cleaning procedure requires great patience and great care as many pump parts are quite small and easy to break when disassembling and assembling them. The key part is to place the disassembled pump parts in a hot water bath at 85°C for hours, or even days to remove the crystallized phosphoric acid, depending on how bad the situation is—you won’t realize how much phosphoric acid can crystallize in the pump head after a certain period of time until you open it up!

Finally, I would like to take this opportunity to personally thank everyone in this Department for their continued support and kind help throughout the year. We have had another fantastic year working together at Baylor! Thanks for all the kind support!
Cover: Ashley Trappe and Amber Garcia measure the orientation of dune faces at White Sands National Monument.

Full spread: The 2019 field camp before descending in the Grand Canyon. Everyone made it back out!

Photo 1: Students mapping thrust faults in Red Rock Canyon, Nevada.

Photo 2: Sarah Al-Marwany and Carson Manka measuring section near Cloudcroft, New Mexico.

Photo 3: Measuring section in the San Juan Mountains.

Photo 4: Alex Goodsuhm, Charles Tompkins, and David Gomez (exiting the lava tube) examine a recent basaltic lava flow in the Mapa region of New Mexico.
Sequence Stratigraphy
Led by Dr. Stacy Atchley
Dr. Jamey Fulton (background) and graduate students Elisabeth Rau, Anna Thorson, and Bart Yeates (foreground) examining a Late Devonian Exshaw Formation outcrop at Jura Creek, Alberta

Petrology
Led by Dr. Kenny Befus
Wayne Hamilton is sneaking a hydrology teaching moment into the undergrad Igneous and Metamorphic Petrology field trip at Inks Lake

Water Management
Led by Dr. Joe Yelderman
Dr. Joe gives a sermon on the mount lecture to Water Management Class along the Brazos River
Baylor Geological Society

BGS/AAPG members made it their mission to get more involved with outreach programs throughout the 2018-2019 school year in order to foster an interest in geosciences with people of all ages.

In Fall 2018, we participated in Earth Science Day at the Mayborn Museum and Fall Fossil Festival at the Waco Mammoth National Monument.

In Spring 2019, we helped at the Girl Scout STEMfest, Mammoths on the March at the Waco Mammoth National Monument, Earth Day Festival at Mother Neff State Park, and a two week long outreach program for fourth graders of Midway ISD at the Waco Wetlands. We continued to host a number of speakers including Morco Geological Services and the National Park Service, as well as visit Langerman Foster Engineering, Trinity Mines, and CP&Y, Inc. Students were also able to take a fall trip to the Natural Bridge Caverns near San Antonio and take a private tour at the Waco Mammoth National Monument.

We also celebrated our second annual holiday bowling party at the end of the fall semester, where the Applied Petroleum Studies lab secured a victory! Students benefited from a number of general meetings focused on applying to graduate school and writing research grants. We hosted a screening of Hostile Planet for Baylor students.

The busy year provided ample opportunity to share love of the geosciences. We’re looking forward to the upcoming school year.

Past Executive Board (2018-2019):
President: Rebecca Taormina, Ph.D. candidate
Service VP: Joe Milligan, Ph.D. candidate
Social VP: Katrina Shiner, M.S.
Treasurer: Will Brewer, Ph.D.
Secretary: Tori Tew, M.S.
Historian: Jenn Wagner, M.S.
Undergrad Rep: Carson Manka, B.S.
AAPG Liaison: Britt Yeates, Ph.D. candidate

Current Executive Board (2019-2020):
President: Ben Sadler, M.S.
Service VP: Chris Mitchell, M.S.
Social VP: Chris Mitchell, M.S.
Treasurer: Wynne Casteel, M.S.
Secretary: Sam Barber, M.S.
Historian: Marisa Oppedisano, B.S.
AAPG Liaison: Britt Yeates, Ph.D. candidate

Baylor Association for Women Geoscientists

Spring 2018 to Fall 2018 marked the inaugural year of the Baylor Association for Women Geoscientists (Baylor AWG/BAWG) student chapter. Founded by Anna Thorson and Elisabeth Rau, BAWG became an officially chartered organization at Baylor University in Spring 2018. The focus of the club is to provide a supportive and encouraging environment for AWG members and to promote the professional development of women in the geosciences. The Baylor chapter concentrates on networking, mentorship, and community to achieve these goals. Baylor AWG hit the ground running by hosting a screening of the Bearded Lady Project followed by a panel discussion at Baylor University’s Women in the Academy Conference the last week of April 2018 featuring Dr. Julie Hoggarth, Dr. Katie Brietz, Dr. Deirdre Fulton, and Dr. Aislyn Barclay.

Inspired by the panel discussion and experiences of that conference, BAWG decided to focus on what is now called “Her/His Stories.” Her/His Stories feature a group of three to four individuals who are peers, professors, or mentors that share their stories to learn from unique life experiences—professionally and personally.

This past year we started a fundraising campaign, co-hosted a Christmas bowling party with the Baylor Geological Society, attended a Jazzercise class, volunteered with the Girl Scout STEM Fest, and hosted Her/His Story panels. The panels featured Baylor professors, a consulting geologist in the mining industry, and graduate students.

Baylor AWG recently elected new officers for the 2019-2020 school year. Congratulations to Elisabeth Rau, President; Julia Wys Vice-President; Roy Bassoo, Mentorship Chair, and Marisa Oppedisano, Undergraduate Representative.

BAWG looks forward to a new year of listening to exciting stories, planning events, and welcoming new undergraduate and graduate students to our geoscience community. It has been an amazing year of growth for our new organization and I hope you are as hopeful as I am for the future of the Baylor Association for Women Geoscientists.

Sincerely and geologically,
Anna Thorson
// BAWG President
Elisabeth Rau
// BAWG Vice President

Student Groups
Ryley M. Collins
Robert T. Hill Award for Academic Excellence in Geology, Represented the Geosciences Department at the spring College of Arts & Sciences Honors Convocation.

Samuel T. Barber
Elan Allen Safety scholarship for outstanding safety plans in field work

Will Brewer
Len Assente Scholarship from the NGWA and Farvolden award from the NGWA for outstanding poster presentation at Groundwater Week in Las Vegas, NV.

Wynne Casteel
Len Assente Scholarship from the NGWA

Aly Baumgartner
Baylor Geosciences fall 2018 Outstanding TA Award for her excellent work as a teaching assistant.

Alexander A. Goodsuhm
Represented the Geosciences Department at the spring College of Arts & Sciences Honors Convocation.

Jiajun (Dylan) Jiang
National Association of Geoscience Teachers Outstanding TA Award - December 2018 for his extraordinary work as a teaching assistant.

Dr. Logan Wiest
Outstanding Doctoral Dissertation Award, Baylor University Graduate School, 2018-2019.

December 2018

Doctor of Philosophy
William E. Lukens
Mentor: Dr. Steven G. Driese
Miocene Paleoenvironments and Paleosol pH Proxies

Katherine (Kasey) C. Boljes
Mentor: Dr. Steven L. Forman
Reconstructing land surface processes of the 1930s Dust Bowl Drought, U.S. Great Plains

Lyndsay M. DiPietro
Mentor: Dr. Steven G. Driese
Late-Quaternary Alaskan Paleoclimate: Geocarchaeological Insights into the Pleistocene-Holocene Transition

BS in Geology
Giselle G. Del Rosario
Emily K. Blackaby
Daniel A. Russell

May 2019

MS in Geology
Adam J. Davis
Mentor: Dr. Stacy Atchley
Climate and Landscape Reconstruction of the Arroyo Chiquito Member of the Nazciento Formation, San Juan Basin, New Mexico: Providing Environmental Context to Early Paleocene Mammal Evolution

Jacob C. Jarvis
Mentor: Dr. Joe C. Yelderman
Compartmentalization in the Northern Segment of the Brazos River Alluvium Aquifer: A Hydro-Forensic Approach

Jennifer D. Wagner
Mentor: Dr. Daniel Pepe
Plant community change across the Paleocene-Eocene boundary in the Gulf Coastal Plain, Central Texas

BS in Geology
Ryley M. Collins
Nicole A. Price

August 2019

MS in Geology
Tyler N. Leggett
Mentor: Dr. Kenny Befus
Rhyolite Lava Emplacement Dynamics Inferred from Surface Morphology Captured with Drones

Erin P. Noonan
Mentor: Dr. Steven G. Driese
Salinity in the Northern Segment of the Brazos River Alluvium Aquifer: A Hydro-Forensic Approach

Anna M. Thorson
Mentor: Dr. Steven G. Driese
Stratigraphic Partitioning and Distribution of Reservoir Attributes within the Late Devonian Duvernay Formation, Western Canada: Sedimentary Basin

BS in Geology
Jie Geng

BS in Geophysics
Christina M. Martinez

We’re proud of these talented, hard-working students for getting awards from various groups at Baylor—and beyond.
Stay in touch.

Let us know where you are and what you're doing! We'll use this info to update our departmental files. Or we can feature you in next year's newsletter.

Send by snail mail
Fill out the form on the back of this page, fold it in half, add a stamp, and drop it in the mail.

Send by email
You can also email your updates to Paulette at Paulette_Penney@baylor.edu.

Send your pictures
Also, remember we have the Geokid bulletin board in the office with photos of children of alumni. To add yours, send your pictures to Paulette_Penney@baylor.edu.

You’re invited.

Join us at the Geosciences Department open house for Homecoming 2019.

When
Friday, October 12
6-8 p.m.

Where
Baylor Sciences Building
E401 Clock Tower

Baylor University
Department of Geology
One Bear Place #97354
Waco, TX 76798-7354
What's new?

Name:

Class of:

Degree:

Phone:  
Email:

Mailing Address:

Company Name:  
Location:

Type of Work:

Would you like to share personal or family updates in the next newsletter?  
Yes  
No

I’d like to share that...

Suggestions:

Alumni News

Blast from the past

The Waco newspaper wanted a photo of students at an outcrop, so we made this one on Waco Creek which ran next to the Geology Dept. on 5th Street in March, 1960.

(L-R) Bill Payne (BA, 1955 & MA 1963), Harold “Baldy” Holloway (MS, 1959), Ted Reel (BS, 1956 & MS, 1960), and Bill Atlee (BS, 1958 & MS, 1960). Harold “Baldy” Holloway survived the Korean War only to die in an auto accident. Bill Atlee was also a Korean War vet.

Photo courtesy of Bill Atlee.

What’s new

David A. Farhie (BS, 1977)

David is a retired teacher and petroleum geologist. Retired from teaching after 27 years. He now lives in Temple, Texas and is President of the Tri-City Gem and Mineral Society.

Craig Whitted (BS, 1971)

Earned a MS in geophysics from University of Arizona in 1999. He has three daughters: Lydia (17), Audrey (14), and Vivian (11) . . . all Baylor fans (gulp), and a lovely wife named Marisa. Craig is an exploration geophysicist and has worked in Nigeria, US Gulf Coast, Colombia, Peru. He is probably most associated with conventional exploration in the US Gulf Coast and AVO techniques. So far in his career, he’s lived in Bartlesville, OK, Tulsa, OK, Houston (twice), Milan, Italy, and is presently in San Antonio. Craig also enjoys gardening, cooking, scuba diving, and traveling.

Emeritus memoriam

Dr. Harold H. Beaver

Harold passed away on October 25, 2018. The Baylor Geosciences Family will miss “Happy” Harold, as he was affectionately known around the department. He left Baylor one of the largest collections of fossil blastoids in North America, but he left behind many more smiles and fond memories. Harold received his Ph.D. from the University of Wisconsin and taught briefly at Lamar University in Beaumont, Texas before coming to Baylor in 1953—just after the disastrous tornado struck downtown Waco. Shortly after, he began his career with Exxon spending time in Bordeaux, France, Weybridge, England, and Singapore.

Harold returned to Baylor as the Geology Department chairman in 1976 and served for 20 years until his retirement in 1995. As an experienced geoscientist with a strong faith and a love of students, Harold was a natural fit for Baylor University. After his retirement, he stayed active for several years continuing to give of his time and resources to the Geosciences department. Condolences to Harold’s family, friends, and many former students. He will be missed and remembered.

Alumni memoriam

Condolences to the friends and families of:

Duncan Brooks (BA, 1988)
June 10, 2019

Dean Flatt (BA, 1971 & MA, 1975)
March 18, 2019

Benjamin Mann (BS, 1957)
May 23, 2019

Bradley Ray (BS, 1979)
October 13, 2018