GeoGram

A publication of The University of Maryland Department of Geology

2019

Photo credit: Dr. John Merck

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LETTER FROM THE CHAIR

Dear Alumni and Friends,

Sorry! You are receiving the Geogram a bit late this year. My excuse? It has been a very busy year for the Department. One time consuming task was the generation of a Departmental self-study, which was followed by a visit from an external review committee. This review process is periodically mandated by the University for all academic units. Although time consuming, it is an important processes which allows an assessment of our current strengths and shortcomings. The good news is that we were commended by the external committee for our high quality undergraduate and graduate programs, as well as "punching above our weight" in world-class research. As noted by prior reviews, our biggest challenge remains the fractured nature of our physical space, with offices, laboratories and storage space spread among 6 different buildings. One day we hope the University will find a solution that enables the department to be housed under one roof.

We have one major personnel addition this year. **Dr. Megan Newcombe** arrived in the Department this fall and has been busy building labs in which to conduct experimental petrology. She comes to us by way of Caltech (Ph.D.), with postdocs at the Lamont-Doherty Earth Observatory and Carnegie Institution for Science. Megan reports on some of the research she is doing elsewhere in the Geogram. Welcome Megan! With respect to other personnel matters, I am also very pleased to announce that **Drs. Mike Evans** and **Sujay Kaushal** were both promoted from Associate Professor to Professor in the past year. Congratulations to both! This year also marks the first donation of a meteorite to our Museum collection. Yep, the meteorites you might have seen on Maryland Day are actually not members of our collection but on loan. The "new" meteorite is all ours! It is a sizable piece of the Canyon Diablo iron meteorite. This is a piece of the much larger meteorite that created Meteor Crater in northern Arizona. It was donated to us by sisters **Louise Lovell** and **Florence Mills**, whose father was originally gifted with it for developing mobile instrumentation for detecting buried metal. We thank both Louise and Florence for their generosity and hope to have the meteorite on display in the Museum by Maryland Day.

High level research continues to be a mainstay of the Department. For example, in the past year **Nick Schmerr** led a UMd team proposal

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Visit to Gorgona Island, Colombia

By
Distinguished University Professor and Chair Richard J. Walker

From left to right: Bruce Aitken, Charlotte DeVitre, Lina Echeverria, Willie Nicklas, Esteban Gazel, Igor Puchtel and Richard Walker.

This past spring I was finally able to complete a more than 30 year quest to visit Gorgona Island, Colombia. Gorgona Island is the real live equivalent for rocks to the fictional Jurassic Park for dinosaurs (although the rocks on Gorgona Island are mainly from the Cretaceous period). The desire to visit this island stems from the fact that the volcanic rocks on Gorgona include komatiites. Komatiites are a very interesting type of rock that was not even recognized as an igneous volcanic rock when I was taught petrology as an undergraduate. Komatiites are typically characterized by high concentrations of the element magnesium, and often by a strange texture referred to as spinifex (so-called because it resembles a type of grass commonly found in Africa and Australia). Although the origins of komatiites are debated (as are many topics in geology), most komatiites likely formed as a result of high degrees of melting of portions of mantle, tens of kilometers beneath the surface. Once formed the magma makes its way upward, eventually erupting as lava flows onto the surface, or onto the seafloor. Some believe komatiites formed by melting in plumes rising from the deep mantle in a manner similar to modern hotspot-derived systems, like the Hawaiian islands. Perhaps the most interesting aspect about komatiites is that they were quite common during the Archean Era (>2.5 billion years ago), and gradually disappeared from the rock record during the Proterozoic Era (~2.5 billion years ago to ~540 million years ago). Most people who work on these rocks believe that the gradual extinction of komatiites occurred because the mantle has been cooling through time, and so it became increasingly less likely for the extensive mantle melting to occur that is necessary to produce the melts. The Gorgona komatiites are remarkable in that they are only 89 million years old! Why this extinct form of rock made a brief re-appearance during the Cretaceous period remains a mystery, and of course a great excuse for further study.

Gorgona Island (~9 kilometers x 2 kilometers), is located about 35 kilometers off the Pacific coast of Colombia. The island has had a chequered history. It received its current name from **Francisco Pizarro**, who in 1527 spent several months on the island with his crew. He named it after the Gorgon Medusa, who you will recall was most famous for the strange attribute of having poisonous snakes instead of hair. Yes, his naming the island Gorgona reflects the fact that the island has one of the densest populations of poisonous snakes on Earth. Apparently they greatly whittled down his crew numbers during the visit. The island has also served as a prison colony for Colombia (only one escape ever occurred), and is currently part of Colombia's national park system.

Most early study of the Gorgona komatiites and related rocks was conducted by the wife-husband team of **Lina Echeverria** and **Bruce Aitken** during the 1980's. Both eventually took jobs with Corning Incorporated. I began a collaboration with Lina in the late 1980's, and she provided samples from the island that I was fortunate to work on over the past 30 years. But I still wanted to visit and re-sample the island. Lina and I were able to reconnect when she visited the Department in 2017 to give a Departmental Colloquium talk. Over dinner following the talk we determined that it might be a good time to try to obtain funding and permission to return to Gorgona. Lina, who is originally from Colombia, was eventually successful at obtaining the necessary governmental permissions, and the National Science Foundation provided funding for the trip. In addition to Lina and Bruce, our party also included **Igor Puchtel** (Isotope Geochemistry Laboratory Manager, and komatiite expert extraordinaire) and his Ph.D. student **Willie Nicklas**. **Esteban Gazel** and his Ph.D. student **Charlotte DeVitre**, both from Cornell University, also joined us.

Getting to Gorgona Island is not so easy. We flew, by way of Miami, to Cali, Colombia, then flew in a smallish plane to the river town of Guapi. This town is accessible only by plane or boat. From there we took a small boat through a stretch of river, then across ~40 km of the Pacific to the island.

Small boat used to get from the mainland to Gorgona Island.

Accommodations were rooms that formerly housed prison administrators.

For the past 10 years the island has been developing somewhat of an ecotourism industry. Quite civilized rooms that were once housing for the prison administrators have been converted to hotel accommodations.

In addition to the geological attractions, the island is even more famous for its diverse flora and fauna. The island is not just about snakes. Just for the record, visitors to the island are required to wear high topped boots to protect against unwanted snake attacks. Among other critters, the island is inhabited by white-faced monkeys, basilisk lizards, and the blue footed booby (that would be a bird).

One of many grumpy white-face monkeys we encountered.

Igor Puchtel presides over one of the few genuine komatiite outcrops on the island.

The good news is that we were not attacked by snakes, although there were a few run-ins with the monkeys, and the komatiites were still plentiful to see and sample.

In all we spent more than a week examining the different rocks present on the island (in addition to komatiites there are basalts, picrites and gabbros) and collected about 52 kg of material. The rocks were transported to College Park and we have begun chemical and isotopic analysis of them. We hope to report some exciting new results in the coming year. Stay tuned!

Bagged rocks ready to travel to the exotic locale known as College Park.

Graduate Student Highlight

Kelsey Wood

By
Professor Sujay Kaushal

Kelsey Wood began her undergraduate journey searching for a calling. Kelsey was undecided about her major when she started at Towson University and was even considering studying graphic arts. Kelsey found her calling when she took her first introductory geology class and immediately felt a strong connection to the subject. After deciding to be a geology major, Kelsey decided to transfer to the University of Maryland (where her father had studied before her) to seek more opportunities in a larger department. Her first impressions of the UMD Department of Geology were filled with excitement and wonder. For the first time, Kelsey was exposed to diverse courses and fields of research spanning the interior of the deep earth, the earth's surface, and extending out into space. After taking several geology courses, Kelsey gravitated towards wanting to learn more about earth's surface processes, especially those related to streams, rivers, and watersheds. Growing up, her family took many trips to Deep Creek Lake in western MD and the Patuxent River flowed near her home in Laurel, MD. Kelsey had grown up hiking and running along the tributaries of the Patuxent River and had always wondered how human activities had changed the river and its water quality over decades of agricultural and urban land development. In order to complete her degree, Kelsey decided to pursue a senior thesis project studying sedimentation rates in the Patuxent River watershed, which was advised by **Dr. Karen Prestegaard** and **Dr. Jay Kaufman.** Kelsey enjoyed learning about channel geomorphology and hydraulics, geochemistry, and how human activities in watersheds impact sediment dynamics within river channels. Increasingly, Kelsey became passionate about her senior thesis research and wanted to learn more about every aspect. She had never felt such a sense of curiosity, intellectual stimulation, accomplishment, and empowerment in starting, continuing, and completing a scientific project. Following graduation, Kelsey worked as a geotechnical consultant, but sorely missed the opportunity to continue learning and growing both as a scientist and a student of the earth sciences. After spending one year at her geotechnical consulting job, Kelsey decided that she wanted to be in an environment, which facilitated more learning opportunities, travel, and autonomy in experimenting and interacting with new approaches, people, and ideas. After much thought about her career directions and future, Kelsey reached out to me and inquired about opportunities for working with our research group. We hired Kelsey as a research assistant, and she quickly excelled in field sampling for our monitoring programs, mentoring students, setting up our new ICP-OES system to measure major and trace elements. Kelsey was also a key collaborator and co-author on multiple scientific papers and projects. Given that Kelsey was still enthusiastic for gaining more knowledge, she continued to take graduate level courses at University of Maryland and routinely attended departmental seminars on different topics. After working with us as a research assistant for one year, we received a new grant from the Chesapeake Bay Trust to study the unintended consequences of stream restoration on groundwater quality. We quickly decided that Kelsey would be a perfect graduate student to lead the research project, given all of her intellectual and creative abilities and work ethic. Billions of dollars are spent in the U.S. each year supporting stream restoration strategies for reducing river pollution loads. A popular form of stream restoration involves hydrologically reconnecting stream channels with floodplain wetlands. These floodplain wetlands are "hot spots" of nutrient and contaminant retention by streamside vegetation and microbial communities. However, major construction activities are

Kelsey Wood sampling groundwater chemistry in riparian zones of restored urban streams.

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Undergraduate Student Highlight

CHRISTY HO

By
Associate Professor Sarah Penniston-Dorland

Cristy Ho has found that a major in geology provides the perfect balance between her lifelong love for art and her interests in science and nature. When Cristy first started college, she did not know what she wanted to major in. Her freshman year she took a charcoal drawing class because has always had a passion for art. She also took an introductory class in geology and it inspired her to major in geology. Since becoming a geology major, Cristy has found that she enjoys the artistic side of geology - in the Structural Geology and Sedimentation and Stratigraphy classes there is a lot of drawing of three-dimensional rock structures, and in the Optical Mineralogy and Petrology classes there is a lot of drawing of minerals in thin section and mineral textures. In fact, **Dr. John Merck**, who advises all of our undergraduates, commonly encourages students to take an art class to help them learn to draw and visualize the three-dimensional aspects of geologic materials.

When she was a high school student, Cristy had the opportunity to work as an intern at NASA Goddard Space Flight Center making field measurements, and analyzing data from Landsat and from the USGS to understand the urban heat island effect and its relationship with climate change. When she was at NASA she had the opportunity to see the room where they were building the James Webb Space Telescope, which is the successor to the Hubble Space Telescope. She was excited by all the research that was happening on the campus at NASA. The experience helped her to realize that maybe scientific research was something that she might want to do for a career. In her first year at Maryland, Cristy gained more research experience working in the geodynamics lab under the guidance of **Dr. Laurent Montési.**

Field experiences have provided Cristy with more opportunities to explore the relationship between art and geology. Cristy attended field camp in the summer of 2019 in Scotland. She filled her field notebook with sketches of famous geological localities such as Hutton's Unconformity and the Moine Thrust. She enjoyed doing field camp in Scotland because it is the birthplace of geology - lots of famous geologists made important discoveries there but also because the geology there relates to the geology of eastern North America due to plate tectonic interactions that both continents experienced. In the summer of 2018 she had the opportunity to travel to Santa Catalina Island with the research group of **Dr. Sarah Penniston-Dorland** to make field observations and collect samples for her senior thesis research. Cristy's thesis focuses on understanding processes occurring deep within the Earth during subduction. She is trying to understand whether melting that produces arc volcanoes can be produced by diapiric rise of material from the subducting slab. She collected subduction-related metamorphic rock samples of the Catalina Schist to represent the material that rises from the slab and analyzed its chemistry and mineralogy. She produced thermodynamic and geodynamic models to understand whether the physical properties of the material would allow it to rise in this fashion. Cristy has worked closely with PhD student **Kayleigh Harvey** to produce the thermodynamic models and with **Dr. Laurent Montési** to create the geodynamic models. Cristy enjoyed working on a project that crosses different subfields of geology because it provided the opportunity to explore different ways to approach research.

Cristy has been an active member of the Geology Club at UMD. She has participated in many club activities including kayaking and hiking trips and has helped tutor students in introductory geology classes. She has enjoyed getting to know fellow Geology students through the club and served as secretary of the club in 2018-2019. Cristy used her artistic skills to design a Geology Club T-shirt logo that was chosen by her peers to decorate the T-shirt two years in a row!

Cristy (far right) in the field (Santa Catalina Island) with PhD student Kayleigh Harvey (far left) and Dr. Penniston-Dorland (middle).

During her time at UMD Cristy found employment that engaged her artistic side through the Art Gallery at the Stamp Student Union. In that job she interacted with visitors to the art exhibits, conducted interviews and wrote blog posts for the gallery website (https://stampgallery.wordpress.com). She found this to be a great way to be creative while getting paid!

Cristy has received much recognition for her hard work while a Geology major. She received two scholarship awards in 2019 (Summer Research, Travel and Educational Enrichment Award from the College of Computer, Mathematical and Natural Sciences and Field Camp Scholarship from the Department of Geology). She applied for and received a senior thesis grant to support analyses for her thesis research in 2019. She has made the Dean's list multiple times (Spring and Fall 2016, 2018, Spring 2019). Cristy was also awarded the Mineralogical Society of

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Research Focus

By
Assistant Professor Megan Newcombe

(L-R): Euan Mutch, Liam Peterson, Megan Newcombe, Nick Culbreth.

What controls volcano explosivity? Can we improve our ability to predict the timing and style of volcanic eruptions? What about volcanoes on other planets- how are they different to terrestrial volcanoes? These are some of the questions that keep me awake at night. I'm excited to be building a Planetary Volcanism Laboratory at UMD to search for some answers!

The major driving force for magma ascent and eruption is buoyancy, which is provided by water- and carbon-dioxide-rich vapor bubbles. The processes operating in a volcanic conduit during an eruption are much the same as the processes operating when you unscrew the lid from a bottle of Coke: The removal of the lid from the bottle releases the pressure on the Coke, causing the carbon dioxide that was dissolved in the pressurized liquid to exsolve and form a rapidly expanding bubbly foam. The vigor of the subsequent Coke eruption depends not only on the amount of carbon dioxide dissolved in the liquid, but also on the speed at which you unscrewed the cap. Similarly, the vigor of volcanic eruptions is thought to depend not only on the composition of the magma, but also on its rate of ascent and decompression.

In the Planetary Volcanism Lab, we seek to understand the behavior of volatiles (e.g., water, carbon dioxide, sulfur, fluorine and chlorine) in magma, and the conditions in magma storage regions and volcanic conduits in the seconds to weeks preceding a volcanic eruption. We approach these problems using a combination of experimental and analytical techniques. My PhD research at Caltech involved studying the behavior of water dissolved in droplets of lunar magma in a gas-mixing furnace. I also developed a way to measure the cooling rate of magma in the seconds to hours preceding syneruptive quenching. During my postdoc at the Lamont-Doherty Earth Observatory, I developed a magma ascent 'clock' that uses concentration gradients of water in olivine crystals (formed in response to syneruptive magma ascent and degassing) to constrain the decompression rate of their host magma just prior to eruption.

This year, we have embarked on new research projects aimed at understanding the timescales of volcanic processes and the behavior of volatiles in magma and meteorites. New Postdoctoral Associate **Dr. Euan Mutch** joins us from the University of Cambridge, where he recently completed his PhD. Euan is an expert in the technique of diffusion chronometry—the use of concentration gradients in erupted tephra (crystals and quenched melts) to constrain the timescales of magmatic processes. Euan is building sophisticated 3D numerical models that will simulate the compositional evolution of crystals in magma during their storage in the crust and ascent to the surface. He plans to compare the results of these models to analyses of crystals sampled during recent eruptions of Piton de la Fournaise volcano.

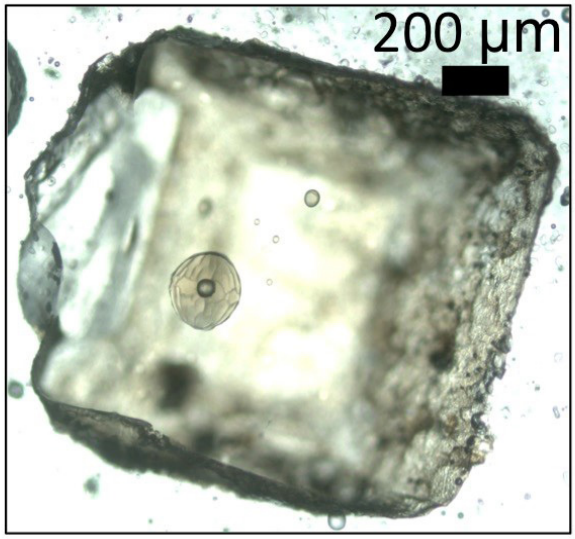
Liam Peterson is a new graduate student in the Planetary Volcanism Lab. Liam has the ambitious goal of trying to work out where Earth's water came from. Water is important not only for driving volcanic eruptions, but also for supporting life and enabling plate tectonics. The presence of oceans on the Earth's surface is seemingly at odds with predictions of models of terrestrial planet formation in the hot, dry inner solar system. Several mechanisms of water delivery to the proto-Earth have been proposed, including delivery of water via comets or water-rich asteroidal material, or 'ingassing' of hydrogen from the solar nebula. Liam is studying a mysterious class of meteorites called Ureilites that are thought to represent one of the earliest-forming bodies in the solar system. He plans to measure the volatile content of a suite of Ureilite meteorites with the aim of understanding the sources and behavior of volatiles during the early stages of planetary accretion and differentiation.

Last but not least, **Nick Culbreth** is doing a senior thesis project in the Planetary Volcanism Lab this year. Nick has the unenviable task of polishing tiny olivine crystals that were collected shortly after the 2016 eruption of Pavlof volcano in the Aleutian arc. Nick not only has to polish crystals that are a few hundred microns in diameter, but he has to doubly expose tiny pockets of trapped magma within the crystals (referred to as 'melt inclusions'). These precious samples of trapped magma

preserve their pre-eruptive water concentrations, enabling us to work out how the magma evolved during its ascent to the surface. Nick's unquenchable positivity is serving him well as he tackles this tricky but exciting project!

The Planetary Volcanism Lab will add several new analytical and experimental capabilities to the department over the next few years. A newly renovated lab in the Geology building will soon house a Fourier transform infrared spectrometer with a linear array detector, capable of mapping concentrations of water and carbon dioxide in minerals and glasses down to sub-ppm levels. Additionally, an experimental lab in the Toll building just across Regents Drive is under construction. This lab will contain furnaces that will be used to simulate conditions (e.g., pressure, temperature and oxygen fugacity) in volcanic conduits. As you can probably imagine, the Fire Marshall is not a big fan of my research methodology.

I'm thrilled to join the UMD Geology Department, and I look forward to updating you as members of the Planetary Volcanism Lab begin to solve some of the mysteries of terrestrial and planetary volcanology. Perhaps then I will be able to catch up on sleep!



Crystal of olivine containing a faceted melt inclusion with a central vapor bubble. The external faces of the crystal are coated in bubbly quenched melt. This crystal was erupted during the 1977 eruption of Seguam volcano, Alaska.

(Chair's letter continued...)

that resulted in the awarding of one of only eight NASA Solar System Exploration Research Virtual Institute grants. This is a big deal as it integrates research conducted in the Department with researchers in Astronomy, as well as at other institutions. I am also delighted to report that a Panorama mass spectrometer is currently being installed in the basement of the Atlantic Building. This instrument is the premier, large footprint (it is really big) mass spectrometer designed to precisely measure isotopologues (look it up) of molecules, such as methane. **James Farquhar** and colleagues spearheaded the effort to acquire the mass spectrometer using funds from the NSF, the University, the College of CMNS and Geology. We'll provide updates on both efforts in next year's Geogram. As always, later in this Geogram you will find information about the honors and awards received by our faculty and students in the past year. It has been a big year for us, with especially high honors bestowed upon James Farquhar, who was elected to U.S. National Academy of Sciences and named Fellow of the American Geophysical Union. Way to go James! **Jay Kaufman** has received a prestigious Fulbright Foundation Global Scholar Award and **Wenlu Zhu** was awarded the Louis Néel Medal of the European Geosciences Union. I was honored to be named the Hess Medalist of the American Geophysical Union. We also received recognition at the University level. **Dan Lathrop** was a winner of the UMd Distinguished Scholar-Teacher Award, **Tom Holtz** received the Provost's Excellence Award for Professional Track Faculty in Teaching, and I was awarded the title Distinguished University Professor (along with the unfortunate acronym DUP). Have a look at all of the other accomplishments, especially of our students, later in this issue. I hope you will continue to be impressed with their accomplishments. It is safe to say that we continue to attract to our program talented and innovative faculty, undergraduate and graduate students.

So…. as I do every year, whenever you have the opportunity I encourage you to visit and renew your ties to the Department and University. Come on by, we'll be happy to see you! We'll even let you touch our new meteorite!

Richard J. Walker

(Undergrad Highlight continued...)

America's Undergraduate Prize in 2019.

Cristy plans to attend graduate school a few years down the road. In the meanwhile she is looking for employment perhaps working in a research lab. She is interested ultimately in pursuing projects investigating plate tectonics combining observations from natural samples and modeling efforts. Her ultimate goal is to find a job in academia or perhaps work for an organization such as NASA. We are proud of Cristy's accomplishments, and we look forward to following both her science and her art in the future!

An example of Cristy's artwork illustrating geology: "The Cliffs of Seljalandsfoss", 2018, Acrylic on canvas.

Recognition & Awards

Faculty & Staff

Wenlu Zhu was awarded the Louis Néel Medal of the European Geosciences Union (EGU) in recognition of her outstanding achievements in rock physics and geomechanics.

Dan Lathrop (Geology & Physics) was a 2019 winner of the UMD Distinguished Scholar-Teacher Award.

Richard Walker is the 2019 Hess Medalist of the AGU, and was awarded the title of Distinguished University Professor.

James Farquhar has been named an AGU Fellow and is a newly elected member of the National Academy of Sciences.

Nicholas Schmerr was awarded one of eight NASA Solar System Exploration Research Virtual Institute (SSERVI) grants.

Tom Holtz received the 2019 Provost's Excellence Award for Professional Track Faculty in Teaching.

Laurent Montesi has been appointed as Editor-in-Chief of JGR-Planets, a journal from the American Geological Union that publishes original research articles spanning the broad field of planetary science, including but not limited to planetary geology, geophysics, geochemistry, atmospheres, dynamics, and exoplanets.

Students

Best Grad Talk (2019): PhD candidate: Samuel Crossley *(Advisors: Sunshine/Ash),* PhD pre-candidate: Laura Sammon *(Advisor: McDonough),* MS student: Hope Tornabene *(Advisor: Walker).*

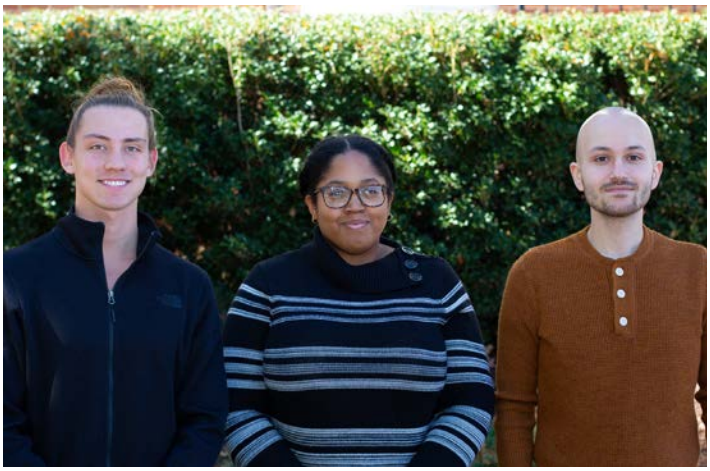
Best Grad Paper (2019): Robert William Nicklas *(Advisor: Igor Puchtel)* for his paper titled "Secular mantle oxidation across the Archean-Proterozoic boundary: Evidence from V partitioning in komatiites and picrites" published in 2019 in the journal "Geochimica et Cosmochimica Acta."

Dean's Fellowship Awardees: James Dottin *(Advisor: Farquhar),* Austin Gion *(Advisor: Piccoli),* Aisha Khatib *(Advisor: Schmerr)*, Angela Marusiak *(Advisor: Schmerr)*, Liam Peterson *(Advisor: Newcombe),* Rumya Ravi (Advisor: Farquhar), Lori Willhite *(Advisor: Arevalo).*

Kenneth Britton, Shannan Jones and **Nick Culbreth** were the 2019 fall recipients of the Marc Lipella Memorial Scholarship.

Kelsey Wood *(Advisor: Kaushal)* and **Haley Talbot-Wendlandt** *(Advisor: Prestegaard)* are the 2019-20 Green Fellowship in Global Climate Change awardees. **Maggie Tan** and **William Nguyen** received 2019-20 Green Scholarships in Environmental Science and Restoration.

2019-20 Green Scholarship in Environmental Science and Restoration awardees (L-R) Maggie Tan and William Nguyen.



2019 Marc Lipella Memorial Scholarship awardees (L-R) Kenneth Britton, Shannan Jones and Nick Culbreth.

Ernie Bell *(Advisor: Schmerr)* received an Ann G. Wylie Dissertation Fellowship for Academic Year 2019-2020.

Rebecca Butcher *(Advisor: Huang)* took home the first prize of poster presentation on the Graduate Research Appreciation Day 2019.

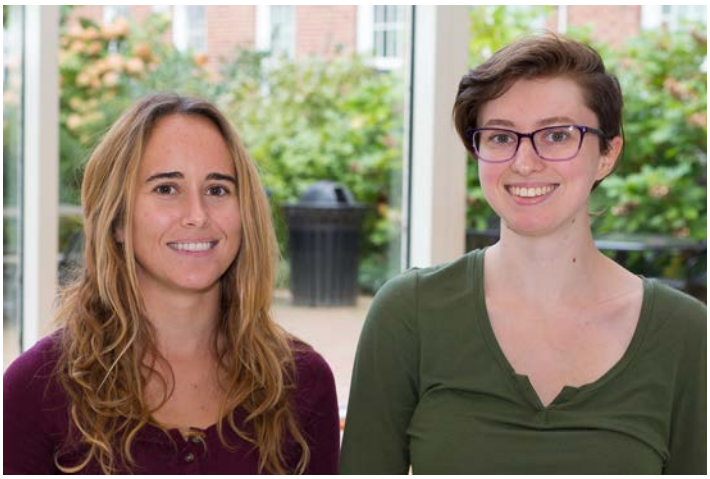
Kristel Izquierdo *(Advisor: Montesi)* received the Outstanding Student Presentation Award from the American Geophysical Union Fall 2018 Meeting.

Angela G Marusiak *(Advisor: Schmerr)* was awarded the Seismological Society of America travel grant in 2019 and was also named a fellow for the 2019-2020 Voices for Science program run by American Geophysical Union.

Robert Willian Nicklas (*Advisor: Puchtel)* received an Outstanding Graduate Assistant Award from the Graduate School.

Karen Pearson *(Advisor: Lekic)* received an Outstanding Graduate Teaching Assistant award from the Graduate School; a Student Presentation Award from the Eastern Section - Seismological Society of America; a Seismological Society of America travel grant in 2019 and the (SREB) Southern Regional Education Board Dissertation Fellowship, the only dissertation award offered by the State of Maryland.

Haley Talbot-Wendlandt *(Advisor: Prestegaard)* won a Geological Society of America research grant.



2019-20 Green Fellowship in Global Climate Change awardees: Kelsey Wood and Haley Talbot-Wendlandt.

(Graduate Highlight Continued...)

sometimes used to reshape the streambanks to allow water from the stream channel to spill out onto the floodplain during floods. These construction activities can involve removal of mature trees growing along the streambanks. Kelsey's thesis work is investigating the magnitude of groundwater quality impacts associated with tree removal in response to the construction phase of stream restoration and how long it takes for groundwater quality to recover following tree removal. Two of Kelsey's study sites are at Campus Creek and Paint Branch located on the University of Maryland campus, and her other study sites are located throughout the greater Baltimore-Washington DC metropolitan area. Kelsey's thesis research uses the UMD campus as a "living hydrologic laboratory" where long-term data can be collected before and after stream restoration. Her research has involved many undergraduate student researchers and fledgling geologists in our department. Most recently, Kelsey has been a mentor to geology senior thesis student, **William Nguyen**, among other students. Kelsey's thesis research will be important in guiding future water quality management efforts involving decisions on whether to preserve or remove trees during stream restoration practices. Kelsey has presented her research results at several national scientific meetings of the American Geophysical Union, in addition to regional stakeholders and policy makers including: the Chesapeake Bay Program Stormwater Working Group, Maryland Department of Natural Resources, Maryland State Highways, and others. Kelsey finds great fulfillment in finding practical applications of her research to better protect and restore the streams and rivers, particularly the ones close to where she grew up around. She would like to continue expanding her research and discovery of new approaches to managing earth surface processes to better protect our water resources.

Congratulations to our recent graduates!

Doctoral Graduates

Erin Cunningham
Advisor: Lekic, Summer 2019

Chao Gao
Advisor Lekic, Summer 2019

Robert William Nicklas
Advisor: Puchtel. Summer 2019

Scott Wipperfurth
Advisor: McDonough, Spring 2019

Tiange Xing
Advisor: Zhu, Summer 2019

Masters Graduates

Rebecca Butcher
Advisor: Huang, Summer 2019

Jonathan Guandique
Advisor: Schmerr, Summer 2019

(L-R): Tiange Xing, Willie Nicklas, Jonathan Guandique, Scott Wipperfurth, Nivea De Assis Magalheas.

(L-R): Jenna Reimer, Julian Leal, Daniel Silberstein, Devin Simmons, Lauren Shepherd, Dashaun Horshaw, Jeng Chong, Jacob Widmer, Jessica Lindsay.

Senior Thesis

The Department of Geology senior thesis program, coordinated by **Phil Piccoli** and **Phil Candela,** has been a fixture of the Department of Geology since 1972. Senior thesis posters have enhanced the program since 2003; these represent one of the four presentations associated with the long established program, which is used as a model of success across campus. We wish each of our departing students, and newest alumni, the best of luck with their future endeavors.

Geology Senior Thesis Titles (GEOL 394): 2018/2019 Academic Year

Adegbulugbe, Olufolakemi. Does Evapotranspiration reduction due to urbanization increase stream base flow discharge? *(Advisor: Prestegaard);* **Chase, Jason.** Hydraulic Controls on Streambank Sediment Grain Size *(Advisor: Prestegaard);* **Chen, James.** Geodetic Investigation of the 2018 Mw 6.4 Hualien Earthquake in Taiwan *(Advisor: Huang);* **Chong, Jeng Hann.** Analysis of the Mw 7.5 25th February 2018 Papua New Guinea earthquake using the subpixel offset method *(Advisor: Huang);* **Elkonoh, Emily.** Mutual Adjustment of Grain size and Gradient in the Channels of Zekiah Swamp Run *(Advisor: Prestegaard);* **Hicks, Tyler.** P-T conditions and chemical changes of a vein and associated alteration in Monviso eclogites *(Advisors: Penniston-Dorland/Hoover);* **Horshaw, Dashaun.** Effect of Pore Fluid Pressure on Slip Behavior of Experimental Fault with Gouge *(Advisor: Zhu);* **Leal, Julian.** Spatial and Temporal Trends in Salinization in the Northeast Branch of the Anacostia River (Advisor: Kaushal); **Lindsay, Jessica.** Emeralds in Hiddenite, NC: Using circular seismic arrays to identify gem-hosting quartz veins *(Advisors: Schmerr/Huang);* **Mills, Alyssa.** Elastic Flexure Models for Sputnik Planitia on Pluto *(Advisor: Montesi);* **Reimer, Jenna.** Comparing Metamorphic Conditions of Catalina Schist Rocks with Zirconium-in-Rutile Thermometry *(Advisors: Penniston-Dorland/ Harvey);* **Shepherd, Lauren.** Geochemical and sedimentological indicators of anoxia in a polar Cretaceous lake with exceptional fossil preservation *(Advisor: Kaufman);* **Silberstein, Daniel.** A Synoptic Survey of Campus Creek *(Advisor: Kaufman/Kaushal);* **Simmons, Devin.** Determining the Accuracy of Remotely-Sensed Evapotranspiration Estimates for Boreal Forest Ecosystems *(Advisor: Prestegaard);* **Slagle, Jairus.** Highly siderophile element systematics of the early Archean mantle: Evidence from 3.3 Ga Ruth Well komatiites, Pilbara Craton, Western Australia *(Advisor: Puchtel);* **Widmer, Jacob.** Interpreting Wind Directions from Sand Dune Morphologies in the Northern Mid-Latitudes of Mars *(Advisor: Prestegaard/Evans/Fenton).*

To see the posters from this year's presentations and lists of theses over the past 40 years go to http://www.geol.umd.edu/seniorthesis.

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We are grateful for the generosity and continued commitment of our donors during the past several years, and we salute those of you who make annual gifts to support the department. We acknowledge the importance of each contribution in support of our education and research missions. Making available opportunities for students to be involved in the excitement of advancing knowledge is critical to the development of the next generation of scientists who will solve problems of societal relevance. In addition, for many of our undergraduates our ability to help with the costs of field camp and senior thesis research is critical to their success.

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