

#### LETTER FROM THE CHAIR

Dear Alumni and Friends,

I have just begun my second year as Chair of the Department! Although almost every day brings a new bit of Departmental/University "excitement" that the Chair must deal with, overall the job has proven to be both very interesting and rewarding. Some aspects of the job are especially rewarding, such as when we are able to search for and ultimately hire the young faculty who become the future of the department. During the spring semester of 2016 a search committee headed by Laurent Montesi worked to fill our structural geology/tectonics position. We interviewed a number of excellent candidates, and ultimately settled on an exceptional, young scientist, Dr. Mong-Han Huang. Mong-Han obtained his Ph.D. from U.C. Berkeley in 2014, and is currently a postdoc at the Jet Propulsion Laboratory in Pasadena, California. He will begin his career in College Park in the fall of 2017. Rather than me telling you what he does, Mong-Han provides a short introduction elsewhere in this Geogram. Have a look! Mong-Han's arrival is a great example of how we endeavor to hire the best. Please help me to welcome him into our Department.

One particularly fun aspect of this job is that I occasionally get to travel the country to meet and greet our alumni. Some of you graduated from UMD before my arrival, but having taught at UMD for 26 years, I know many of you as former students from Petrology. This "traveling roadshow", is a great way to allow me to catch up with what you are doing, and keep you informed of what is new in the Department. For example, I traveled to Houston in October and had a wonderful time discussing current happenings in College Park with a number of our Texas-based alumni. If in the future you should receive an invite to come to a Departmental event in your area, please don't be shy! Do come!

Every year in this letter you get to hear that maintaining adequate funding for our operations is a challenge. This year is no exception. As I write this letter, the University System of Maryland has just been informed that it will receive a cut to its state budget of more than 18 million dollars. Although cuts to the greater "System" don't sound so bad, ultimately they filter down to the departmental level, and make conducting our educational and research business increasingly difficult. For example, reductions in our budget can mean that we have inadequate resources to replace aging materials used in teaching, such as microscopes and computers. There is some good news here. Thanks to the generosity of a number of you, the Department Endowment is now up and fully running. This endowment will provide us with a yearly income that will help us to keep our teaching materials state-of-theart. During the past year, for example, we used funds to purchase a new petrographic microscope to be added to our teaching collection (pictured). This allowed us to replace an ancient, single ocular microscope that once roamed the Earth with dinosaurs. Donations also allow us to offset the costs to some students with unmet financial needs for activities, such as field camp. I encourage you to contribute what you can.

Contributions can be donated to either our Department Endowment or Operating Account. Donations to the Department Endowment are a long-term investment in the Department's future needs. Donations to our Operating Account are immediately accessible for critical needs. If you would like more information about either of these funds, or if you are interested in including the department in your estate plans, please feel free to contact me directly.

Every year we like to end this letter by encouraging you to visit us and renew your ties to the Department and University. If you currently live nearby in the greater Baltimore-Washington DC area, a great opportunity for this is on Maryland Day, when the Department of Geology opens its museum to the public, and we show off some of our more interesting rocks and minerals from the collection. Almost all of our faculty participate in this event. But we'll be happy to see you and talk with you about our exciting research at any time. Come on by...

Kichard & Walker



# GRADUATE STUDENT HIGHLIGHT DANIEL ELDRIDGE

By Professor James Farquhar

**Daniel Eldridge** is an understated and accomplished Maryland graduate who has a strong dose of humility. He came from Colorado to Maryland in 2010 as an incoming Ph.D. student, and this past August, defended a dissertation on sulfur isotope geochemistry in inorganic aqueous systems. He has since taken a prestigious Postdoctoral Fellowship at the Geophysical Laboratory, Carnegie Institution for Science.

Daniel credits his initial interest in geology to "camping trips and outdoor adventures" with his father that he describes as trips to "strange places in southeastern Colorado (where nobody goes) with modest canyons made up of sedimentary rocks with dinosaur footprints". He also credits his father with encouraging him to take classes a year or two after he had graduated from high school, which led to his enrollment at Red Rocks Community College. There, he signed up for a number of business classes, but fortunately for us in Earth Science, he also added classes in chemistry and geology.

The chemistry class captured his interest in what things were made of (atoms, elements, and molecules). You will see that he continues to draw on this theme in his own work. He describes the geology class as "truly eye opening". It was taught by a professor named Jack Stanesco, who provided an inspiring look at the Rocky Mountains and geology. This class made him look at these mountains in "a completely different light", and question why they were there. Daniel found himself taking solo hikes in the foothills around Denver with geologic maps he bought at the local USGS office in the Denver Federal Center. He also visited the USGS library to



Daniel Eldridge in his element at the Indian Peaks Wilderness, Colorado. Picture by Cami Ward.

read books; one by **Norman L. Bowen** still sticks in his mind.

His time at RRCC also gave him a record that allowed him to enroll at the University of Colorado in Boulder, where he took an introductory geochemistry course cotaught by **Professors Lang Farmer** and **Alexis Templeton** that hooked him on geochemistry. While Lang taught him about isotopes and radioisotopes, Alexis tied ideas from introductory chemistry to real-world geological problems involving equilibrium and solubility of minerals.

His interest in sulfur redox chemistry, a focus of his dissertation at the UMD, thus began with the realization at CU that processes like pyrite oxidation and acid mine drainage were largely the result of microorganisms (abiotic kinetics are much too slow to explain acid mine drainage). He had never imagined that biology could play such a major role in geology or that kinetics could be so important.

He paid his way through college with work study in labs, cleaning beakers and doing routine column chemistry for Sr isotope analyses, then worked on a senior thesis project that took him to Hawaii and then Stanford to do research on low-temperature weathering of basalt. This research project solidified his desire to pursue graduate studies in geochemistry. He chose to apply to the program at Maryland because of advice given to him by another of his mentors **Eve-Lyn Hinckley**, but he says now that he didn't know what to expect or if we Marylanders might be "mean and scary".

Daniel's describes his first impression of the group at Maryland as: "These guys are crazy, but in a good way!" From our perspective we saw Daniel as someone who was very talented, but wore some of the strangest, five-toed, shoes we had ever seen; So craziness in a good way applied to all parties and meant that he would fit in nicely with the group at UMD. And he did, quickly carving out his own niche at Maryland, learning arcane arts like scientific glass blowing and developing experimental and computational geochemistry capabilities. He liked the intensity and diverse but complementary interests of his peers and mentors, and one thing that stood out for him "was the excitement of it all."

While at Maryland, Daniel was supported by a combination of research assistantships, teaching assistantships, and a 3-year NASA Earth and Space Sciences Fellowship, and finally by a 2 year NSF grant that he helped to write. Daniel paid back into the educational system, mentoring two high school students **Diandre Sheridan** and **Anisha Hosadurga** and one 393/394 thesis student, **Noah Bowman**. As Daniel's advisor, I watched the students he mentored

(continuted on page 8...)

## UNDERGRADUATE STUDENT HIGHLIGHT

#### JUSTINE GRABIEC

By Associate Professor Sarah Penniston-Dorland

Justine Grabiec grew up fascinated by watching shows on the Discovery Channel. It was there that she became interested in science. It was exciting to her that there were always more things to discover. Her freshman year in high school she volunteered at a local planetarium in her home community in New Jersey and continued to work there through high school. She learned a lot through this job because she was given a lot of responsibility including presenting "Star Talks" about the night sky. She came to Maryland as an astronomy major, and in the spring of her freshman year she went on a geologyastronomy field trip to Arizona led by Drs. John Merck and Tom Holtz. On this field trip she became interested in geology and switched her major to Geology with a minor in Planetary Science.

Her many work experiences and activities demonstrate the commitment Justine has to public outreach and service. The summer between sophomore and junior years she worked through GeoCorps as an intern at the Rock Creek Park Nature Center on a variety of outreach activities including astronomy shows (they have a planetarium) but also summer programs for kids. Her junior year she volunteered for the Food Recovery Network which brings leftover food from the University of Maryland campus to people in need of food through shelters and churches. She has also served as first the treasurer and now the president of the student-led Geology Club at Maryland.

Justine really enjoys working in the field as a geologist. She believes that fieldwork is important to provide a context for understanding geologic processes. For her



Justine enjoying all things green at field camp!

senior thesis she is investigating a fault within subduction-related metamorphic rocks of the Catalina Schist with Dr. Sarah Penniston-Dorland. She joined the Penniston-Dorland research group on Santa Catalina Island to do the fieldwork for her project in January, 2016. For this project she is investigating a low-displacement fault with a thick fault core, which is an unusual combination. She is using structural observations along with geochemistry and mineralogy to determine the origin of the fault material and to constrain the timing of faulting. She is especially fascinated by the diversity of subduction-related metamorphic rocks.

Justine attended field camp this past summer and found confirmation of her passion for geologic fieldwork. She is adding new tools to her geology tool kit by working in **Dr. Richard Walker's** Isotope Geochemistry Lab learning rock preparation methods and clean lab chemistry to extract and measure highly siderophile element concentrations and isotopic compositions. She will apply these methods to her senior thesis project.

Justine has received much recognition for her hard work while a Geology major. She was awarded the Mineralogical Society of America's Undergraduate Prize in 2015, and the Marc Lipella Memorial Scholarship and two scholarship awards in 2016 (Field Camp Scholarship from the Department of Geology and Summer Research, Travel and Educational Enrichment Award from the College of Computer, Mathematical and Natural Sciences).

Justine plans to attend graduate school and wants to continue her path of discovery studying hard rock geology. Her ultimate goal is to find a job in academia or perhaps working for the US Geological Survey or National Park Service. We are sure that with her curiosity, intelligence, organizational skills, and motivation, Justine will continue to make us proud!



Justine in front of the fault she is studying on Santa Catalina Island



## **FACULTY HIGHLIGHT**

George Helz The Geochemical Roots of UMD

> By Professor Alan J. Kaufman

In the years before Geology had an undergraduate program, geochemistry was established at the University of Maryland as a division of the Chemistry Department - filling a vacuum in the absence of a formalized Geology Department. One of the first hires in this new direction was this year's Faculty Highlight, George Helz. Trained as an experimentalist at Princeton (where he was deeply influenced both by his senior thesis advisor, the remarkable geochemist Dick Holland, and by Harry Hess, who developed the theory of seafloor spreading and plate tectonics) and at Penn State (where he was a Ph.D. student of geochemist Hugh Barnes), George expected that he would get a job in a Geology Department or the USGS. Fortunate for us, when he heard about the new initiatives in geochemistry and environmental chemistry at Maryland, the homeboy (George grew up in nearby Gaithersburg) applied and was hired in 1970 as an Assistant Professor.

The Chemistry hiring splurge was in part a response to the new environmental movement in the United States. This was a national awakening driven in part by publication of **Rachel Carson's** Silent Spring, and the public outcry that ensued against the indiscriminate spraying of pesticides (especially DDT). George Helz was particularly intrigued by the sudden burst of interest in "environmental problems resulting from ignorance and the careless disposal of mining waste. I "I maintain, that I have never met anyone who matches George's ability to take a given set of data and squeeze every last drip of useful scientific information from it."

was an experimental geochemist interested in the transport of industrially important metals like mercury and cadmium, and as pollutants they suddenly had become a national priority."

At Maryland, George focused his redox studies on the element molybdenum and the geochemistry of sulfidic (lacking oxygen but containing hydrogen sulfide) aqueous systems. Related to these, he tackled a number of scientific problems associated with the contamination of estuaries and coastal regions. Helz said, "The problem that I started worrying about in 1988 was [how and why] Chesapeake Bay became anoxic and sulfidic in summertime? One argument was that the bay was getting inundated with nutrients...run off from farms and NOx from automobiles and so forth." According to George, these nutrients were stimulating the production of organic matter, which sank into deeper waters where it consumed oxygen through decay thereby stimulating microbial sulfate reduction that produced poisonous hydrogen sulfide.

Estuarine and coastal eutrophication is a growing global problem that affects marine life, and historical reconstruction is a necessary step for identifying its causes and designing its remedies.

Helz's fundamental research on molybdenum-sulfide geochemistry began with the successful use of X-ray spectroscopy to measure molybdenum concentrations in sediment cores in order to reconstruct the history of "dead zones" in Chesapeake Bay. George said, "It appeared to me that if we looked for molybdenum in sediments we could project a time frame for the sulfidic conditions, and then we could see if that correlated with the onset of the Green Revolution." The Green Revolution was a legacy of WWII when the United States built up its ability to fix atmospheric nitrogen [through the Haber process] to make munitions. After the war the US had this huge capacity, so the munition industry started making fertilizer instead. "If nutrients were the problem we would find that the Bay really wasn't depositing much molybdenum prior to WWII," said Helz. Indeed, he found that there was a steady ramp up of molybdenum in Bay sediments after the war, but also some evidence for isolated sulfidic conditions back in the 19th century. It appeared that historically the Bay had been near a tipping point, and the Green Revolution pushed it over.

A distinctive feature of Helz's papers is

that they build bridges between laboratory measurements and the geologic or biological processes that they wish to explain. One of his past students and current collaborators, Trenton Vorlicek of Minnesota State University, said "George Helz is one of the most brilliant people with whom I have had the pleasure to know. I maintain, that I have never met anyone who matches George's ability to take a given set of data and squeeze every last drip of useful scientific information from it." For a recent nomination of George as a Fellow of the Geochemical Society, Gordon Brown of Stanford University wrote, "George has published almost 30 papers on the geochemistry of metal sulfides, which are classics in terms of their clarity and simplicity of experimental design and their fundamental importance." Throughout his career, George has provided extensive service to the Geochemical Society. He was Treasurer from 1975-1978, and he was a member of the Organizing Committee and the Technical Program Chair for the First V.M. Goldschmidt Conference in 1990 in Hunt Valley, Maryland. Furthermore, George was an Associate Editor for Geochimica et Cosmochimica Acta from 2002 to 2012.

Helz has similarly been active in a variety of other societies and organizations in support of the Earth sciences. For the international community, George was a member of the Organizing Committee and Co-Chair of a Subcommittee for the 1989 International Geological Congress in Washington, D.C. For the American Chemical Society, Helz was a Charter Member and Chair of the Division of Geochemistry from 1984-1985; he served two terms on the Editorial Advisory Board of the highly rated ACS journal, Environmental Science and Technology. For the region, George was a trustee of the Chesapeake Research Consortium from 1991-2000. The CRC is a non-profit corporation chartered by the State of Maryland involving six institutions with a long-standing history of research on problems affecting the Chesapeake Bay and its watershed. Through the same interval Helz was the Director of the Maryland Water Resources Research Center, a federally-funded institute that supports research, teaching, and outreach activities. And finally, George has been

especially active with the Geological Society of Washington – the first organization of its kind in the US founded in 1893 – where he has held office as President (1995-1996), First Vice President (1995), Second Vice President (1984) and Councilor (1973-1974 and 1979-1980).

George Helz has been honored by a variety of professional and academic institutions. These include his Magna Cum Laude graduation at Princeton University (1964), election as a Fellow of the Mineralogical Society of America (1985), and his recognition as a Distinguished Scholar-Teacher (2001-2002) and Rainmaker (V.P. list of top 100 faculty in research support in 2003-2004) at the University of Maryland. George has also received honors for his work in Environmental Science from the American Association for the Advancement of Science (1988), from Manchester University, U.K (as a Senior Visiting Fellow in 1989-1990), from Stanford University (as the Allan Cox Visiting Professor in 1998-1999), and from the Fullbright Foundation where he worked as a scholar at the Rudjer Boškovic Institute in Zagreb, Croatia (2005-2006).

George has graduated more than 30 Ph.D. and over 20 M.S. students in his career. At

every level of his laboratory, university and community involvement, George has shown a strong leadership capability. All colleagues agree that Helz's research will have a lasting impact on future generations of environmental and deep-time geochemists.

While never a member of the Geology faculty, Helz has been a collaborator with a number of students and faculty in the department, and in his role as Director of the Water Resources Center funded several hydrological and environmental projects. Emerita Professor Ann Wylie, the first Geology faculty to receive the President's Medal and who has served in the highest leadership positions at our University, said, "George has been an exceptional scientist. He was interested in the growth of the Geology Department and as soon as we had a graduate program he began to have involvement, limited at first, but progressing steadily over the years. Geology faculty and students have always benefitted from his collegiality and his involvement with the department." Since his retirement in 2005, Helz has been especially active in the Geochemistry seminars and has been a generous contributor to the Geology Department.



Geochemistry Professor George Helz in his natural laboratory environment.

# RESEARCH FOCUS

#### Βy

ASSISTANT PROFESSOR NICHOLAS SCHMERR

The internal structure of the Earth, planets, satellites, and numerous other objects in our Solar System remain largely unexplored. There are still fundamental questions that remain about the composition, heat budgets, layering, and evolution of planetary interiors and surfaces that can only be answered with the tools of geophysics. On Earth, we have the distinct advantage of being able to visit remote regions and deploy instrumentation to learn about the subsurface, but for other worlds, we must send robots or astronauts to collect the necessary datasets.

The Planetary Geophysics Laboratory on the University of Maryland campus seeks to answer fundamental questions about the subsurface structure of other worlds, both through careful analysis of existing datasets and by developing new methods for acquiring and interpreting planetary geophysical datasets. Our lab specializes in seismological data that are recorded by seismometer instruments sensitive enough to feel an earthquake on the opposite side of the planet. Currently, the only seismology dataset outside of Earth was collected by seismometers deployed the Apollo astronauts back in the late 60's and early 70's on the Moon. However, the upcoming NASA mission InSight will place seismometers on Mars, painting an entirely new picture of the martian interior.

Currently, the lab takes advantage of abundant seismometer data on Earth to study our own planet and develop geophysical analogs that serve as a proxy for understanding the interiors of other planets. To that end, we use data from a variety of terrestrial environments to study earth processes, and also to understand the requirements of instruments placed elsewhere in the Solar System. Current PhD students **Angela Marusiak** and



Geophysical traverses in the San Francisco Volcanic Field. Magnetometry Dr. Nicholas Schmerr (UMD), and Ground Penetrating Radar PhD student Ernest Bell (UMD). Image Credit: Ernest Bell.

**Ernest Bell** both use Earth as an analog for their planetary studies, and PhD student **Quancheng Huang** studies the deep internal structure of our own planet.

For her PhD, Angela Marusiak is using earthquakes recorded by the Black Forest Observatory seismic station in Germany to determine how the upcoming InSight seismometer experiment will be able to detect the martian core with a similar dataset of mars quakes. Her analysis of terrestrial data is revealing that InSight should be capable of detecting lateral variations in the martian mantle, as well as revealing the depth of Mars' core. She has presented these results to the Lunar and Planetary Science Conference in Houston, TX, and is now a collaborating science team member of InSight.

Ernest Bell has been using simulations of seismic waves generated by impacts to help determine the size of an explosive charge needed to light up the interior of a small asteroid. He has also been involved in a multi-institutional effort led by the University of Maryland to study the collection of geophysical datasets by astronauts on the Moon and Mars. This effort is taking place in the San Francisco Volcanic Field to the north of Flagstaff, Arizona. We completed our first field season in October of 2016, collecting over 200 active source seismic profiles, deploying 5 broadband seismometers, and obtaining multiple ground penetrating radar and magnetometry transects along the traverses taken by astronauts in geological training several years prior. We were joined in the field by astronaut **Don Petitt** from Johnson Space Center, Kelsey Young from NASA Goddard, and Ryan Porter from Northern Arizona University. With these datasets we will be able to answer numerous geological questions about the layering of lava flows,

relationship of volcanism to bedrock, and the evolution of the volcanic field, and relate our findings back to exploring planetary surfaces with geophysics.

As I'm fond of reminding my planetary colleagues, Earth is a planet too! Quancheng Huang has been using an extensive dataset of earthquakes to study the upper mantle of the Earth. He has been working closely with postdoctoral scholar **Dr. Lauren Waszek** (now at New Mexico State University starting an assistant professorship) to map the anisotropy present within a section of the mantle where minerals undergo a major reorganization of their crystal structure. Both he and Waszek have been using their findings to understand the evolution and dynamics present deep within the Earth.

Finally, the analog work in the Planetary Geophysics Laboratory extends to the outer Solar System, including the icy and ocean worlds around Saturn and Jupiter. For the past two summers (2015-2016), we have been collecting active source seismic data on the eastern Greenland ice sheet to understand the presence of a liquid water aquifer that is perched on top of the ice sheet. This aquifer is developing as global warming increases the amount of surface melt present on the ice sheet. This research involved an undergraduate student from Atmospheric and Ocean Sciences, **Lynn Montgomery**, who accompanied Dr.



Eastern Greenland Seismic Experiment. Hammer wielder: Dr. Clement Miege (University of Utah), Hammer Instruction: Dr. Nicholas Schmerr (UMD), and Computer Operator: undergraduate student Lynn Montgomery (UMD). Image Credit: Lynn Montgomery.

Schmerr onto the ice sheet during the field season of 2015. She recently submitted a paper on our findings, showing that the volume of water in the aquifer has increased between field seasons.

Understanding the properties of seismic wave propagation in terrestrial environments, as well as on ice and ice sheets will be essential for planning and the operation of future geophysical arrays throughout the Solar System. Our laboratory seeks to enhance and implement geophysical science on future missions to objects ranging from asteroids to planets that will lead to breakthroughs in our understanding of planetary interiors and their evolution.



Arizona San Francisco Volcanic Field Geophysical Analog Team. Left to Right: Dr. Ryan Porter (Northern Arizona University), Dr. Nicholas Schmerr (UMD), PhD Graduate Student Ernest Bell (UMD), and Dr. Kelsey Young (NASA-Goddard). Image Credit: Don Petitt.

### **MEET** *DR. MONG-HAN HUANG*

Dr. Mong-Han Huang will be joining the Geology faculty as an Assistant Professor in July 2017. Dr. Huang tells us that "My research focuses on using geodesy to measure crustal deformation, and what we can learn about the lithospheric properties, fault mechanics, and seismic hazards based on these measurements. Events such as large earthquakes can drive Earth's crust to deform continuously even years afterwards, and the duration and the amount of deformation provide a window into Earth's internal properties. With geodetic tools such as GPS and Interferometric Synthetic Aperture Radar (InSAR), we are able to use co- and postseismic deformation to constrain the rheology structure of lithosphere in different tectonic regions."



## **GRADUATE STUDENT HIGHLIGHT (CONT...)**

develop a deep understanding of the underlying science and attention to detail that is rare.

The topic of Daniel's dissertation developed from discussions with then post docs **Alexey Kamyshny** and **Aubrey Zerkle** about the aqueous oxidation of sulfide. Kamyshny is presently an Associate Professor at Ben Gurion University, and Aubrey Zerkle is a lecturer at St. Andrews University and he visited each to conduct some aspects of his work. The focus of the dissertation further evolved with his participation in a seminar at Maryland on computational chemistry and isotope effects. This seminar brought in a visiting post doc, **Weifu Guo**, who is now a Scientist at the Woods Hole Oceanographic Institution. Daniel's research thus brought together experimental geochemical studies of sulfide oxidation rates and fractionations and ab initio computations of the isotopic properties of sulfur species in clusters of water molecules.

His theoretical work has recently been published in a comprehensive article in the journal *Geochimica et Cosmochimica Acta*. In this article, he combines abinitio calculations with constraints drawn from a variety of aqueous geochemistry studies to resolve several longstanding questions about isotope fractionations in aqueous sulfur systems. One of his findings is that the proportions of isomers (molecular species with the same chemical compositions, but different structures) play a critical role in determining the isotopic fractionations in aqueous sulfur systems. A second paper on his experiments is presently in review.

Daniel's expertise in sulfur chemistry has also made him a sought after collaborator. His first coauthorship at Maryland was one where he was the sole UMD coauthor and was asked by another group for expertise needed to address sulfur chemistry within microbial cells. More recently, he developed ways to identify and characterize sulfur extracts from meteorites for another collaboration that were key elements in telling a story of low temperature chemistry occurring in the solar nebula.

He continues to expand his research portfolio, and with his recent move to the Geophysical Laboratory, Carnegie Institution for Science, is now using diamond anvil cells to study supercritical S chemistry – the experimental charges are sandwiched between two gem quality diamonds and interrogated with spectroscopy – and other approaches to study to partitioning between liquid and solid metal. It seems fitting that he should land in a place where experimental chemistry and geology overlap and also where N.L. Bowen, the author of that book he read at the USGS in Denver as a new to geology student, spent a large part of his career.

### **RECOGNITION & AWARDS**

## Faculty & Staff

Vedran Lekic was the recipient of the 2016 CMNS Board of Visitors Junior Faculty Award.

**Igor Puchtel** was named as one of two awardees of the 2015 CMNS Distinguished Research Scientist Prize.

#### **Students**

Hailong Bai (Advisor: Montesi) received a Wylie Dissertation Fellowship.

**Ernie Bell** (*Advisor: Schmerr*) received one of the 2016 Lunar and Planetary Institute Career Development Awards.

Ben Belzer, Albert Chen and Justine Grabiec were the recipients of the Geology Undergraduate Field Camp Scholarships.

Luke Councell, Justine Grabiec and Madison Turner were the recipients of the Spring 2016 Marc Lipella Memorial Scholarship.

**James Dottin** (*Advisor: Farquhar*) received a NASA travel grant for the Goldschmidt conference.

**Austin Gion** (*Advisors: Candela*/*Piccoli*) received the Preservation Award, an honor bestowed by the Kansas Geological Foundation.

Kristel Izquierdo Gonzalez (*Advisor: Montesi*) received an AGU Fall Meeting Student Travel Grant.

**Dorothea Lundberg** – MEES/Geology Student (*Advisor: Prestegaard*) received a GSA Research Grant, a GSA Hydrogeology division outstanding student award, and a John T. McGill and Carol G. McGill Award in Geomorphology and Engineering Geology and a AWRA summer award.



Geology Undergraduate Field Camp awardees (L-R) Justine Grabiec, Ben Belzer, and Albert Chen



Heart Christian High School student Kobi Robinson (pictured with John Merck above) won the 2016 Geology Department prize for Best Earth Science related project entitled "From wet trash to clean cash" at the Prince George's County Science Fair.

**Nivea Magalhaes** (*Advisor: Penniston-Dorland*) received a GSA Research Grant to support her research on the geochemistry of mafic intrustions and sulfur.

**Paul Neuberger** was the 2016-17 awardee of the Green Scholarship in Environmental Science and Restoration.

Karen Pearson (Advisor: Lekic) received a "best student poster" award for her presentation "Investigating Tidal Triggering of Induced Seismicity in Oklahoma Using Schuster Spectra" at the meeting of the Eastern Section of the Seismological Society of America in October.

**Scott Wipperfurth** (*Advisor: McDonough*) received the Graduate School Summer Research Fellowship & DOE-INFN Summer Exchange Fellowship.

**Tiange Xing** (*Advisor: Zhu*) was the 2016-17 awardee of the Green Fellowship in Global Climate Change.



Marc Lipella Memorial Scholarship awardees (L-R) Luke Councell, Justine Grabiec and Madison Turner



(L-R) Jessica Kronenwetter, Deborah Fishbeck, Shayna Quidas, John Milne, Elizabeth Lee, Grace Duke, Sutton Chiorini, Benjamin Belzer, Albert Chen, Nicholas Baumann.

#### SENIOR THESIS

The Department of Geology senior thesis program, coordinated by **Phil Candela** for 17 years 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): 2015/2016 Academic Year

Baumann, Nicholas. Stratigraphic Reconnaissance of the Helderberg Group near Moorefield, West Virginia (Advisor(s): Kaufman/Merck); Belzer, Benjamin. The Effects of Pore Fluid Pressure on the Frictional Behavior of Antigorite Serpentinite: Implications for Slow Slip on Subduction Zone Faults (Advisor: Zhu); Chen, Albert. Evolution and Ecological Associations in Herbivorous Theropods (Advisor: Holtz); Chiorini, Sutton. Characterizing Seismic Swarm Morphology (Advisor: Lekic);

Duke, Grace. Characterizing the El Nino Southern Oscillation (ENSO) variability using Sr/Ca-based SST and  $\delta^{18}$ O-derived SSS from the Southwest Pacific (Advisor: Evans); Fishbeck, Deborah. Stable Isotope Tests of Evaporative Marine Environments in the Late Silurian Tonoloway Formation of West Virginia (Advisor: Kaufman); Lee, Elizabeth. The effect of sulfate inputs on sulfide abundance and sulfur isotopic compositions of two constructed wetlands (Advisors: Kaufman/Kaushal/Prestegaard); Kronenwetter, Jessica. The effects of stream channelization on floodplain groundwater levels, Anacostia River, Maryland (Advisors: Prestegaard/Schmerr); Milne, John. Spatial Distribution of Volcanic Features on Mars (Advisor: Montesi); Quidas, Shayna. The role of fluid chemistry, pressure, and temperature on deformation microstructures in limestone (Advisor: Zhu).

To see the posters from this year's presentations and lists of theses over the past 38 years go to http://www.geol.umd.edu/seniorthesis.

#### CONGRATULATIONS TO OUR RECENT GRADUATES

#### DOCTORAL GRADUATES

Daniel Eldridge Advisor: Farquhar, Summer 2016 Harrison Lisabeth

Advisor: Zhu, Summer 2016

**Rose Smith** Advisor: Kaushal, Spring 2016 Ming Tang

Advisors: McDonough/Rudnick, Spring 2016 **Emily Worsham** Advisor: Walker, Fall 2016

#### MASTERS GRADUATES

**James Dottin** Advisor: Farquhar, Summer 2016 Mark Larson Advisor: Montesi, Summer 2016 Anthony Mautino Advisor: Lekic, Summer 2016 John Wilks Advisors: Candela/Piccoli, Fall 2015

# Thank you to our *annual fund* donors!

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.

Your generosity benefits our students in many ways. Therefore, once again, we ask for your support. Tax-deductible gifts to the department can be made online through the UMCP Foundation website:

Enter <u>http://go.umd.edu/geologyannualfund</u> in your browser's address field to be taken directly to the Geology Department's gift giving site. We've also enclosed a postage-paid return envelope for check or cash gifts. If you are writing a check, please be sure to include "Geology Department Endowment" or "Geology Operating Account" in the notes section to ensure that your funds are allocated properly.

#### BENEFACTORS

(November 6, 2015 - October 31, 2016)

#### Up to \$99 per year

Deborah L. Masterson Daniel M. Masterson Jacqueline Anna Shea Mark G. Shupe Barrett L. Smith Martin D. Walther

Up to \$100 - \$249 per year

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Photo by Professor Alan J. Kaufman

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Front Row, (I-r): Alan Jay Kaufman, Ann Wylie, James Farquhar, Tracey Centorbi, William McDonough, Thomas Holtz, Michael Brown, Richard Walker, Philip Candela, Sarah Penniston-Dorland, Igor Puchtel, Michael Evans. Vedran Lekic. John Merck, Nicholas Schmerr, Richard Ash, Karen Prestegaard, **Daniel Lathrop** 

Second Row (I-r): James Dottin, Scott Burdick. Chao Gao.

Scott Wipperfurth, Mitchell Haller, Samuel Crossley, Tom Doody, Angela Marusiak. Greg Archer, Andrea Mundl, Katherine Bermingham, Jiangyi Hou, Kayleigh Harvey, Hailong Bai, Nivea Magalhaes, Tiange Xing, William Hoover. William Kibikas, Connor Hilton, Enriqueta Barrera, Karen Pearson, Valentina Puchtel, Todd Karwoski

Back Row, (I-r): Quancheng Huang, Joanna Patterson, Suzanne Martin. Matthias Trachsel, Alex Lopatka, Tolulope Olugboji, Michael Wilks, Phillip Goodling, Austin Gion, Sona Chaudhary, Pritwiraj Moulik, John Hollingsworth, Kristel Izquierdo, Joe Schools, Alexis Martone, Justine Grabiec, Diana Bojanova, Dorothy Brown, Kyle Ludwig, Meng Guo, Michelle Montero, Ernie Bell

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