GeoGram

A publication of
The University
of Maryland
Department of
Geology

2017

Photo credit: Dr. Maureen Feineman, Penn State University

LETTER FROM THE CHAIR

Dear Alumni and Friends,

This was a busy year for the Department of Geology! We have advanced on several fronts. I wish to draw your attention to the addition of two tremendous new faculty to the Department. **Dr. Mong-Han Huang** officially joined us as an Assistant Professor in October 2017. His primary research interests are in the use of geodetic tools to monitor and quantify crustal deformation (see the 2016 GeoGram for more details). Among other courses, he will begin teaching Structural Geology in the spring semester. **Dr. Ricardo Arevalo, Jr.** joined our Department at the beginning of the fall semester, 2017, as an Associate Professor (see article on page 6). Rick obtained his Ph.D. from our department in 2010. In fact, his 2010 thesis was chosen for a Charles A. Caramello Distinguished Dissertation Award in the first year of that competition. He then spent the next seven years at the NASA Goddard Space Flight Center. We have been fortunate to lure him away from his civil servant job into the ranks of our faculty. Rick's scientific research is focused on analyzing geological samples from the Earth and other differentiated rocky objects, and establishing comprehensive models of the chemical compositions of planetary interiors. Among other courses, Rick now teaches High Temperature Geochemistry. I am also extremely pleased to announce that **Dr. Wen-lu Zhu** was promoted from Associate to Full Professor in the past year. Congratulations Wen-lu! Finally, rounding out major changes in personnel, I report that **Prof. Phil Candela** will be retiring at the end of the 2017-18 academic year. Phil has ably served the Department for more than 30 years, and has been the mainstay of the Senior Thesis program since the retirement of **Peter Stifel** in 1996. We are currently conducting a search to fill the position he is vacating.

In addition to changes in personnel, I have good news to report regarding our departmental facilities. First, **Prof. James Farquhar**, in collaboration with several other faculty from Geology and elsewhere on campus, was successful in acquiring a National Science Foundation Major Research Instrumentation grant to purchase a state-of-the-art stable isotope mass spectrometer, with the capability to precisely measure isotopologues (molecules that differ in their isotopic compositions), one of the new frontiers in isotope geochemistry. Second, we have also obtained funding from NSF and NASA to replace our aging multi-collector inductively-coupled plasma mass spectrometer. The new ICP mass spectrometer is expected to be installed some time in 2018, while the MRI mass spectrometer will likely arrive in 2019.

Other exciting news includes the creation of the ***Peter B. Stifel Geology Senior Thesis Endowment***. As many of you know, Peter ran the Senior Thesis program for most of his career. Peter has generously donated the funds for creation of the endowment, which will help to fund field, travel and analytical expenses for senior thesis projects. We are deeply indebted to Peter for this wonderful gift! I also want to announce that this is the

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INSIDE THIS ISSUE

Faculty Highlight

The Father of Geology at the University of Maryland:

Leonard R. Fernow

By
Professor Alan J. Kaufman

The GeoGram alumni highlight this year on **Leonard R. Fernow** reaches back to the very origins of Geology as a discipline at the University of Maryland. Fernow arrived at Maryland in 1964 – after a three year stint as a petroleum geologist at Texaco – having been hired by **Prof. Jim Miller**, the Chair of the Agronomy Department. Fernow was the first scientist on campus to teach Physical and Historical Geology to the hordes of students needing courses in the natural sciences.

Fernow was born amid the Finger Lakes in Trumansburg, New York, but grew up in nearby Ithaca where his father **Karl Fernow** was a Professor of Agronomy. The elder Fernow was a widely recognized authority on potato diseases, especially those caused by viruses. *"Dr. Potato Head to you,"* said **Lisa Fernow**, one of Leonard's four children, in a recent phone interview. Leonard's early interest in Geology likely stemmed from all the gardening they did on the farm. Her sister **Gale Alcorn**, who was also on the line, speculated that looking for fossils in the dirt was way more fun than inspecting plants for diseases. Leonard's childhood friend, **Joe Dodds**, reminisced about Fernow's early interest in Geology in a letter he sent to Leonard's children in 1999. Dodds wrote, *"In 1954 I was teaching science in Rock Springs (Wyo) High School. There was not much around there but rocks, and I had found some crystals and fossils of different types. Len was in OCS training at that time, so I sent him some interesting samples. He wrote back that he appreciated receiving the package, but his buddies at camp were incredulous that he didn't get packages of home-baked cookies, but rocks???"*

Assistant Professor Leonard Fernow judging a UMD fraternity kite making competition.

Nature, it seems, was in Leonard Fernow's blood. Not only did his father Karl have dirt under his finger nails, his paternal grandfather has been called the "father of professional forestry in the United States". **Bernhard Fernow** was the third chief of the USDA's Division of Forestry from 1886 to 1898, and he planted many of the seeds for the US Forest Service that was established in 1905. Bernhard's philosophy towards forest management was controversial, but widely influential; he was the first dean of the New York State College of Forestry at Cornell, the first four-year forestry school in the US, and the building where the college was housed is still named after him. Furthermore, Karl's mother's father was **Horace Kephart**, a travel writer and librarian best known as the author of *Our Southern Highlanders* about his life in the Great Smoky Mountains. Kephart campaigned for the establishment of the national park, saw it happen in his own lifetime, and also helped to plot the route of the Appalachian Trail through the Smokies.

Leonard Fernow was a likeable, witty, and award winning teaching professor who

Leonard the acrobat (the muscular fellow on the left in the middle of the stack as part of the Flying McDyfers) who once considered running away to the circus.

received his B.S., M.S. and Ph.D. degrees at Cornell University under the tutelage of **John Wells** – the famous paleontologist who had estimated Paleozoic day lengths by measuring diurnal growth rings in horn corals. Wells' observations *"proved physicists correct in their measurement of the deterioration of the Earth-Moon rotation system through gravitational drift…which they used to advance the Expanding Earth theory,"* said emeritus **Prof. Galt Siegrist**.

Siegrist had first met the Fernow family at their home in Ithaca through his older sister who lived there, and later he helped Leonard and his growing family move into a home near to his in Bowie, Maryland. A year later, Fernow informed Siegrist (who was at the time working as a research scientist at Glidden) about a second Geology position in the Agronomy Department. After interviewing, Galt joined Leonard as an Assistant Professor of Mineralogy, *"and immediately went on to Food Stamps."* In the fall of 1965, Siegrist taught over 300 Physical Geology students in the Armory Building gun range, while Leonard taught similar numbers of students in the same course elsewhere on campus.

Fernow was similarly instrumental in bringing emeritus **Prof. Peter Stifel**, another Cornell alumni, to campus. Stifel was visiting the Smithsonian Institution and a Paleontological Society of Washington meeting in 1964 when he spied Leonard across the room. Recognizing him immediately, Pete went up to him and said, *"I'm sure you don't remember me, but I was in your lab seven years ago at Cornell."* A couple of years later, Fernow called Stifel (who was working at Fort Belvoir at the time) and urged him to apply to yet another Geology position in the Agronomy Department. *"The [Geology] lines were falling from the skies,"* said Siegrist. In rapid succession, **Ann Wylie**, **Jerry Widener**, and **Tony Segovia** were corralled with Leonard and the others in the eves of J.M. Patterson Hall.

Almost all of the Geology faculty lived in Bowie, and Leonard and Galt would commute together to and from the university. On these trips Fernow would regale Galt with his knowledge of classical music, his love of wine and cheese, and his thoughts of once running away to be an acrobat in a circus. Joe Dodds first knew him as a part of the Flying McDyfers, including Bob **Mc**Cartney, Rolf **Dy**ce, and Leonard **Fe**rnow (McDyfers, get it?). Joe wrote, *"They put on some school assembly shows. I admired his athletic ability, and particularly the fun he seemed to be having tumbling around."*

While he was a faculty at Maryland for six years, Leonard's life and career were sadly cut short by an aggressive cancer. He first mentioned the problem to Galt, who urged him to see a doctor, only to find that he was

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Leonard Fernow with his wife Roberta Pierson Fernow and children Lisa, Kristin (Stith), Gale (Alcorn), and Lawrence in 1967 or 1968.

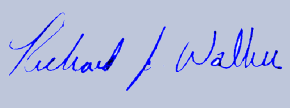
Letter from the Chair

(continued from page 1)

kickoff year for the ***George and Rosalind Helz Distinguished Lecture in Geology***. This fund will allow us to annually host a world leader in science for one or a series of lectures. We expect to announce and host the first Helz Lecturer sometime during the spring of 2018. George spent his career in the Department of Chemistry and Biochemistry, yet greatly enriched our program by collaborating with geologists on a variety of scientific projects and student advisement over the years (see the 2016 issue of the GeoGram for more information on George). Many of us have also had the pleasure of collaborating with Roz, most notably on rocks from Hawaii. Roz spent most of her career at the U.S. Geological Survey in Reston. Many thanks go to George and Roz!

One of the fun things about this job is that I can put a picture of me in the annual letter. This is not something that is wise to do very often, but this year was special for me. I was made the first "Honorary Doctor" of the Oulu Mining School, Oulu University, Finland, in May 2017. This came about as a result of my longstanding interactions with my friend and collaborator Prof. Eero Hanski, of Oulu University. One of the wonderful outcomes of this honor is that I now have a fabulous new graduation hat and sword (I am pictured with my new hat, sword, as well as my wife Mary Horan). The hat will no doubt accompany me to all future graduation ceremonies at Maryland. The sword…., maybe not.

As I do every year, I encourage you to visit us and renew your ties to the Department and University, if you have an opportunity. I remind you that if you live nearby in the greater Baltimore-Washington DC area, a great opportunity for this is on Maryland Day (usually held in April).



Graduate Student Highlight

Harrison Lisabeth

By
Professor Wen-lu Zhu

Harry checks out xenoliths in the granite during a kayak trip at the Spicer Meadow Reservoir in the Sierras.

Like many other geologists, **Harry Lisabeth** collected rocks as a kid, but never seriously considered geology until he became a college student. Harry credits a Planetary Geology class taught by Prof. Jim Head at Brown University as an eye-opener for him. He remembers feeling mesmerized by stunning pictures of the moons of other planets. Harry was completely enchanted to learn how much geologists could infer about the tectonic processes on those planets based on the structures in these images, captured from hundreds of millions of miles away. Frozen in the intricate finesse of rock structure is a captivating dance, and Mother Nature is the choreographer. To Harry, a geologist's job is to recreate the four-dimensional dance from lower-dimensional data—a job that requires both logical rigor and narrative imagination. He started taking more and more geology classes and his interest grew from there. Geological field trips to the southwest and frequent backpacking trips around New England intensified Harry's fascination with geology.

Harry came to the Department of Geology first as a visiting researcher. After graduation from Brown University in May 2010, he took a Research Assistant job in the Lamont Doherty Earth Observatory (LDEO), under the supervision of Prof. Peter Kelemen. At LDEO, Harry was given a task to measure permeability of olivine-rich rocks undergoing carbonation reactions. To conduct these experiments, Harry came to the Laboratory for Rock Physics at UMD in November 2010. When he first laid his eyes on the deformation apparatus, the hydraulic powered piston cylinders and a full range of Craftsman hand tools in the lab, Harry knew that he'd found his academic home. He fell in love with this line of research. Self-categorized as a haptic learner who needs to turn the screws and twist the knobs to really understand, Harry says that poking around the lab is especially good for him as an old football training injury prevents him from sitting in front of a computer for too long. Harry also felt lucky that he had the opportunity to meet all the people in the department and that made the decision to go to graduate school at UMD easy. He joined the Rock Physics group as a PhD student in Fall 2011.

For his PhD thesis, Harry focused on carbonation of ultramafic rocks and its application as a geological storage method of CO_2 sequestration. He got interested in carbon mineralization while writing a paper for an undergraduate class. His chosen topic was geo-engineering, where he stumbled across the idea of speeding up the natural weathering of silicate rocks to remove carbon from the atmosphere. Each year, ~100 million tons of carbon are bound naturally by mineral carbonation. Because of the abundance of silicate rocks and the permanence of the carbonated solids, researchers propose that injecting large volumes of out-of-equilibrium carbon-rich fluids into the subsurface could provide a safe means to sequester CO_2. Harry was intrigued by the idea and its potential in combating global climate change.

While at UMD, Harry tackled one of the least understood aspects of geological carbon sequestration, namely the mechanical response of reservoir rocks to reactive fluids. To investigate the chemo-mechanical response of ultramafic reservoir rocks to carbon dioxide injection, Harry designed a mixing vessel to run reactive percolation experiments under both hydrostatic and deviatoric stress conditions. Harry's experimental data illuminate mechanisms of coupling in ultramafic-CO_2 systems that are essential for characterizing the long-term behavior of future carbon reservoirs.

For his outstanding performance, Harry will receive the prestigious *Mineral and Rock Physics Graduate Research Award* from the American Geophysical Union (AGU). The award ceremony will take place during the 2017 AGU Fall Meeting in New Orleans.

Outside academia, Harry enjoys playing music, reading fiction and backpacking. Harry played in bands in the DC area all through graduate school and credited the music for keeping him refreshed and sane. Some of his favorite musicians are Fela Kuti, Captain Beefheart, and Melt Banana. Harry is an avid reader. He was often seen reading a book while walking along the Wing II corridor in the Chemistry Building. His favorite authors include Richard Brautigan, Naguib Mafouz and Zadie Smith. To Harry, backpacking is the best way to really get away from the worries of the civilized world and spend some time with the sky--also a great way to see more rocks.

Now a postdoctoral scholar with the

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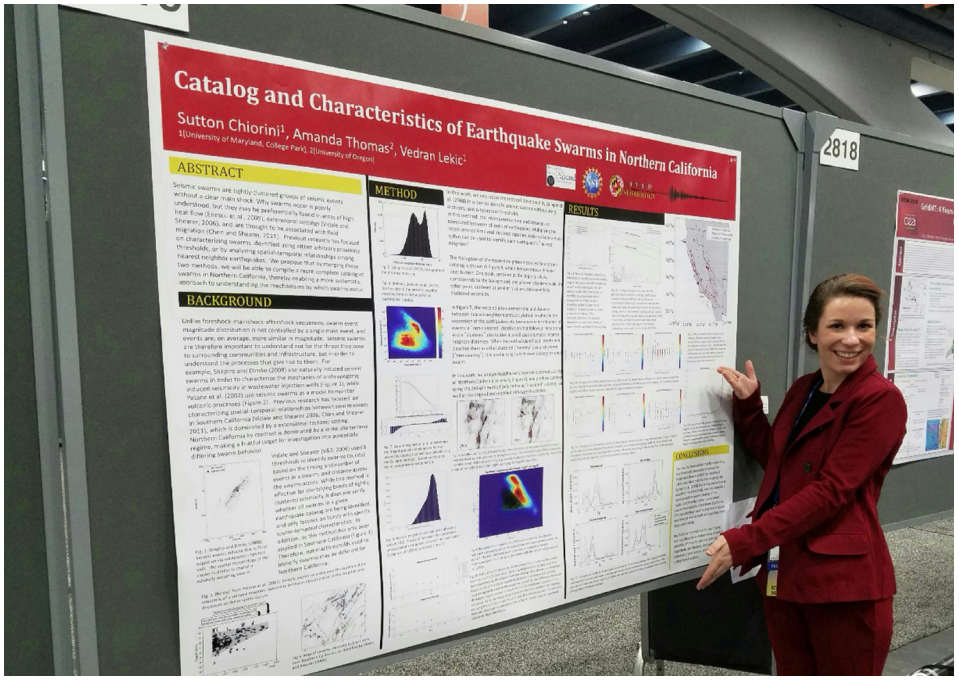
Undergraduate Student Highlight

Sutton Chiorini

By
Assistant Professor Vedran Lekic



Sutton Chiorini presents her results about swarm seismicity in California at the American Geophysical Union 2016 Fall Meeting, San Francisco.

"A lot of the swarms don't follow any mapped faults," explains **Sutton Chiorini**, referring to earthquakes in Redding, California, that seem to occur in groups without a clear main shock. Since 2013, Sutton has been analyzing these unusual earthquake patterns across Northern California, and she knows the particularly weird ones by heart, like the set of swarms deep beneath Redding whose quakes spread out horizontally, in contrast with the vertical swarms that trace volcanic conduits further east.

Sutton started her research as the first student to partake in the SeismoABCs initiative, funded by the National Science Foundation to expand seismology research opportunities for freshmen and sophomore students. She identified and read relevant scientific literature on her own, coming across a fairly obscure paper that outlined a novel technique for identifying earthquake swarms. Using this technique, she discovered that standard methods woefully undercount the true number of swarm events. In itself, this was an important discovery; however, she pushed the research further, systematically probing the characteristics that caused the undercounting, and devising ways of improving the standard swarm techniques so that they produced fewer false negatives. Sutton continues to analyze the first-ever catalog of swarm earthquakes in Northern California, which she compiled as part of her Geology Senior Thesis project. In Summer 2015, an award from the CMNS Alumni Network allowed her to take her passion for research abroad, at a six-week research program at the University of Tokyo studying earthquake faulting.

It has turned out to be an unusual journey for a student who came to College Park an aspiring novelist, or political scientist, or linguist – dead set against following in the footsteps of her parents and becoming a scientist. Unusual, perhaps, but not surprising. *"I really enjoy figuring out how things work and putting the pieces of the puzzle together, and seismology is a lot of taking bits of information and interpreting them into a bigger picture,"* she says, reflecting on her journey. Like too many students, Sutton was not exposed to geology before college, but a semester of Physical Geology awoke in her a fascination with geological processes in general, and earthquakes in particular. As a College Park Scholar at Maryland, Sutton quickly recognized the importance of understanding the physical underpinnings of geological processes, and decided to put in the extra effort and dedication needed to pursue a double degree in Geology and Physics.

This semester, Sutton enrolled in the Master's geophysics program at Miami University of Ohio, with Prof. Mike Brudzinski as her primary research advisor. She connected with Prof. Brudzinski at the American Geophysical Union meeting in San Francisco last fall, where she presented her swarm catalog, beaming in scarlet excitement. Since her departure from Maryland, her fellow seismologists and lab-mates miss Sutton's boundless enthusiasm, unusual independence, broad curiosity in science, and a willingness to challenge herself in research, academics, and even equestrianism.

Leaping over obstacles takes training and determination; Sutton has plenty of both.

Research Focus

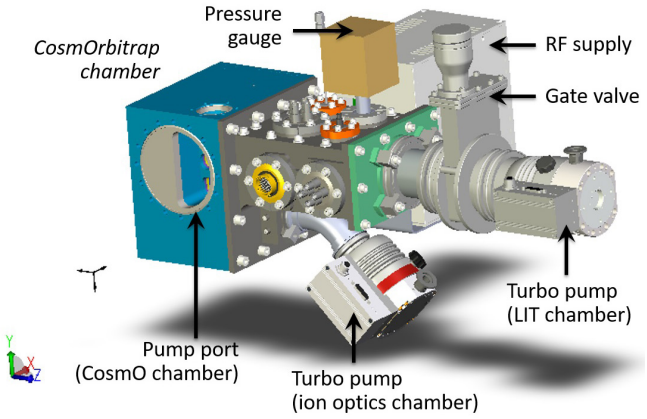
By
Associate Professor Ricardo Arevalo

The compositions of planetary objects, extending from the sun-scorched surface of Mercury past the hydrocarbon lakes on Titan and out to the icy comets in the Kuiper Belt, reflect chemical and thermal gradients that characterized the early solar nebular disk. Internal heating, driven by gravitational collapse, high-energy impacts, and the decay of radioactive nuclides, enabled the physicochemical differentiation of many of these bodies, including the segregation of iron-rich metal to form the cores of the inner planets. Consequently, laboratory studies of terrestrial (e.g., mantle-derived volcanics) and extraterrestrial materials (e.g., meteorites), coupled with *in situ* investigations of planetary surfaces (e.g., via the Sample Analysis at Mars investigation onboard the Curiosity rover), tell an epic tale of the dramatic evolution of our solar system.

As a hybrid between a classically trained geochemist and a mission-oriented planetary scientist, my research ambitions are multifaceted. For one, I continue to be interested in refining our understanding of the architecture of the Earth's mantle, both today and in the geological past. Although a variety of compositional and structural archetypes have been proposed to describe the organization of the mantle, many uncertainties plague these models. The degree of volatile element depletion, the temporal and spatial evolution of oxygen fugacity, and the chemical identity of deep mantle domains remain only loosely constrained. In an attempt to improve our understanding of such issues, my laboratory research relies on the development of innovative analytical protocols to measure trace element abundances with high precision and accuracy via state-of-the-art femtosecond laser ablation mass spectrometry. Pulsed femtosecond laser systems enable efficient ablation of geological samples, regardless of major element chemistry, with minimal thermal alteration, and by extension, reduced elemental fractionation. Recently, my laboratory endeavors have centered on the measurement of redox-sensitive elements in mantle-derived materials, particularly transition metals in primitive olivines, cerium and europium anomalies in ancient Archean zircons, and selenium/tellurium ratios in mid-ocean ridge basalts. These studies, coupled with statistical investigations into publicly available datasets, will demonstrate the viability of such elemental signatures as proxies for oxygen fugacity, and ultimately bound the variance in redox conditions present in the mantle today and through the Archean.

My research interests are not limited to the Earth, however, but rather extend to other rocky objects within our solar neighborhood. In many cases, the same geochemical systems used as proxies for geological processes on our own planet may be extended to other planetary bodies. Achondrites serve as snapshots into the physical evolution of various meteorite parent bodies, providing fundamental clues to the accretion and internal differentiation of planets and planetesimals. In addition to meteorites, *in situ* investigations in the form of comets/asteroid flybys, exospheric orbiters, and planetary landers/rovers offer paradigm-shifting insights into the dynamics of atmospheres, surfaces, and deep interiors of other worlds. My research programs embraces both of these information pathways through the chemical analysis of precious meteorite samples and the advancement of cutting-edge analytical instrumentation adapted for spaceflight. In particular, I have become deeply invested in the development of miniaturized pulsed laser systems, including those offering femtosecond pulses and/or multiple output wavelengths, for laser desorption/ablation processing of rocky and/or icy planetary materials, including cores. Moreover, I am pursing a low-power inductively coupled plasma source for the atomization and subsequent ionization of laser ablation products, and the adaption of an ultrahigh mass resolution Orbitrap analyzer for spaceflight. As a Science Team Member for the SAM investigation on the Curiosity rover, and the MOMA instrument onboard the ExoMars rover, I also remain firmly entrenched in the augmentation of heritage quadrupole mass filters and ion trap mass spectrometers for near-term mission opportunities.

As a new faculty member in the Department of Geology, I hope to pioneer a new graduate program geared specifically towards training the next generation of Principal Investigators for planetary exploration. The program will consist of fundamental laboratory measurements of terrestrial and extraterrestrial materials, the definition and application of novel analytical techniques using commercial instrumentation, and ultimately the design, development, and demonstration of spaceflight instrumentation. These studies will be conducted in close collaboration with colleagues in the Department as well as those at NASA Goddard Space Flight Center. The regular cadence of NASA Discovery and New Frontiers missions, and the upcoming Europa Lander call, will provide steady opportunities for students to join science and/or instrument development teams.



The AROMA project (PI: Arevalo Jr.) funded through the NASA PICASSO Program will integrate a heritage-derived linear ion trap (a la the MOMA spaceflight instrument onboard the ExoMars rover) with an Orbitrap-based spectrometer to enable ultrahigh mass resolution, and by extension the disambiguation of complex chemical signals and potential biosignatures. This investigation is particularly well-suited for the exploration of airless planetary objects, from small bodies (e.g., comets and asteroids), to the moons of Earth and Mars (Phobos/Deimos), and extending to many high-priority ocean worlds (e.g., Enceladus and Ganymede).

Maryland Geologists in the Alps

By
Associate Professor Sarah Penniston-Dorland

Will Hoover (UMD) with his foot on a pillow basalt of the Chenaillet Ophiolite overlooking Montgenevre, France. Photo credit: Grace Beaudoin (UT-Austin)

This past summer, Maryland geologists **Associate Prof. Sarah Penniston-Dorland** and PhD student **Will Hoover** joined forces with faculty, post-docs and students from eight other US institutions and three European universities to study metamorphic rocks in the Western Alps. The goal of the five-year project is to trace the cycle of rocks and fluids through the subduction process in rocks exhumed from a fossil subuction zone in the Western Alps. Penniston-Dorland is one of three directors of the project - called E-FIRE (ExTerra Field Institute and Research Endeavor) which is an offshoot of ExTerra (EXhumed TERRAnes), an organization which she co-founded.

ExTerra is a group of scientists who study rocks exhumed from paleo-subduction zones in order to better understand processes and inform research occurring in active subduction zones today.

The E-FIRE project is driven by three overarching research questions: 1) How are elements cycled by fluids within subduction zones? 2) What are the timing and conditions of subduction zone processes? 3) What is the mechanical behavior of subduction zone materials? Each of the US institutions has a student or post-doc whose research focuses on addressing one or more of these questions using different techniques. The project is funded by the National Science Foundation through the Partnerships in International Research and Education program. It emphasizes international partnerships with geologists in France, Italy, Germany and Spain.

Penniston-Dorland, Hoover and twenty-five other geologists spent three weeks being introduced to the complexities of Alpine geology by their European colleagues and collecting samples for the E-FIRE project. The full range of subducted rocks, (serpentinite, oceanic crust and sedimentary cover) and pressure-temperature conditions (from relatively shallow to ultra-high pressure (diamond bearing)) were investigated. Most days involved extended hikes, some with vertical gains of 1000+ meters, and knee-jarring descents carrying backpacks full of samples. Together the group collected 700 kg of rock that were air-freighted back to the USA. One unique aspect of E-FIRE is that the samples collected will be shared amongst the group and ultimately will be available to the greater community of geologists.

Will Hoover is doing his PhD advised by Dr. Penniston-Dorland and is focusing his research on understanding fluid-rock interactions in subduction zones using Li isotopes as a tracer of metamorphic fluids. This will involve work at the University of Maryland using inductively-coupled mass spectrometers (ICP-MS) and travel to the University of Lausanne in Switzerland where he will use the secondary ion mass spectrometer to measure Li isotopes *in situ* with a spatial resolution of 20 microns! These data will be connected to metamorphic fluid release and transport through rock features indicative of fluids, such as veins. Ultimately, Li can be used as a "geospeedometer" to determine timescales of fluid movement as well as constraining fluid sources and element mobility. Fluid flow in subduction zones has been connected to seismicity and also is ultimately responsible for generation of arc volcanoes above subduction zones, so the research has implications for our understanding of hazardous Earth processes.

Will Hoover (UMD), Ryan Stoner, and Sarah Penniston-Dorland (UMD) taking field notes using twentieth and twenty-first century technologies in the Dent Blanche subduction interface, Ollomont, Italy. Photo credit: Dr. Maureen Feineman (Penn State Univ)

Faculty Highlight

(CONTINUED FROM PAGE 3)

seriously ill with testicular cancer. *"A death warrant,"* said Lisa. Fernow underwent experimental treatments at the National Institutes of Health with Interferon, a natural protein that was discovered only a few years before that is produced in response to the presence of several pathogens, including viruses, bacteria, parasites, and tumor cells. While it is most commonly used to treat multiple sclerosis today, Interferon was used in combination with chemotherapy and radiation to treat Fernow. He went into remission, and was able to take another wonderful trip to Europe with his wife, *"where he went to all the hot spots of Sedgewick and Murchison and all those people…the heroes of yore that he worked into his lectures,"* said Siegrist.

On his return from Europe, the cancer relapsed and spread to Leonard's lungs. *"He was in and out of the hospital a lot,"* said Lisa, and he died a few months later on June 19, 1971. He was only 41 years old. Gale said of those last months *"when he was really sick a couple of girl students would come in an old Volkswagen"* and take us off of their parent's hands. Gale indicated that Galt was critically important to the family at this time. *"He was my godfather. For me he was my back up dad."*

Asked if Fernow had great expectations for the future of Geology at Maryland, Galt said, *"There was no vision in the beginning, there was just a course. I'm not sure he would have led the charge given his illness."* He added that *"Leonard knew a lot about a lot of things; he was a dilettante in the finest sense of the word."* Pete and Ann continued that Fernow was a fabulous lecturer, had a quick wit, liked to pun, and had a runaway IQ. While few alumni will remember the father of Geology at the University of Maryland, the foundation and the initial growth of the faculty was clearly directed by Leonard Fernow. The current success and breadth of the Geology Department undoubtedly benefitted from the efforts and vision of this remarkable scientist and educator.

Galt Siegrist, Ann Wylie and Pete Stifel together at the lunch to discuss Leonard Fernow.

Graduate Student Highlight

(CONTINUED FROM PAGE 4)

Harry Lisabeth loading a sample into the pressure vessel in my lab.

Stress and Crustal Mechanics Group at Stanford University working with the Stanford Center for Carbon Storage, Harry is collaborating with scientists from a consortium of academic institutions, government labs and industry to understand the basic physics behind short- and long-term behavior of carbon dioxide in the subsurface. He continues his quest of learning how earth works while making time to play music, read books and go backpacking in the redwood forests.

Recognition & Awards

Faculty & Staff

Joanna Patterson received the CMNS Outstanding Employee award.

John Merck received the Thelma Williams Advisor of the Year award.

Students

Grad Talk Awards recipients (2016): PhD candidate: **Alex Lopatka** *(Advisor: Evans)*, PhD pre-candidate: **Allison Greaney** *(Advisor: Rudnick)*, MS student: **William Kibikas** *(Advisor: Zhu)*

Best Paper Award (2016): Ming Tang *(Advisors: McDonough/Rudnick)*

Grad Talk Awards recipients (2017): PhD candidate: **R. William Nicklas** *(Advisor: Puchtel)*, PhD pre-candidate: **Angela Marusiak** *(Advisor: Schmerr)*, MS student: **Phillip Goodling** *(Advisor: Lekic)*

Best Paper Award (2017): Emily Worsham *(Advisor: Walker)*

Luke Councell, **Caroline Liegey** and **Rhobeca Oliveros** were the recipients of the 2017 Undergraduate Field camp scholarships.

Sam Crossley *(Advisors: Sunshine/Ash)* was selected for a prestigious NASA Harriet G. Jenkins fellowship grant.

Chao Gao *(Advisor: Lekic)* received an Outstanding Student Paper Award at the 2016 American Geophysical Union Fall Meeting.

Shahan Haq *(Advisor: Kaushal)* received the 2017 Green Fellowship in Global Climate Change.

Harrison Lisabeth *(Advisor: Zhu)* received the 2017 AGU Mineral and Rock Physics Graduate Research Award.

Joanna Patterson and John Merck at the CMNS Faculty & Staff Awards Ceremony.

Joseph Schools *(Advisor: Montesi)* received a competitive 2017 NASA Earth and Space Science Fellowship.

Devin Simmons received the 2017 Green Scholarship in Environmental Science and Policy.

Ming Tang *(Advisors: McDonough/Rudnick)* received the Charles A. Caramello Distinguished Dissertation Award.

Hope Tornabene, **Rhobeca Oliveros**, **Elizabeth Peters**, and **Jacob Widmer** were the Fall 2016 recipients of the Marc Lipella Memorial Scholarship.

Madison Turner won the Mineralogical Society of America Undergraduate Prize.

Scott Wipperfurth *(Advisor: McDonough)* received an East Asia and Pacific Summer Institutes Fellowship for U.S. Graduate Students (EAPSI) through NSF.

Emily Worsham *(Advisor: Walker)* received the 2016 Nininger Meteorite Award.

Geology Undergraduate Field Camp awardees (L-R) Caroline Liegey, Rhobeca Oliveros and Luke Councell.

Marc Lipella Memorial Scholarship awardees (L-R) Rhobeca Oliveros, Elizabeth Peters, Hope Tornabene and Jacob Widmer.

Congratulations to our recent graduates!

DOCTORAL GRADUATES

GREG ARCHER
ADVISOR: WALKER, SPRING 2017

HAILONG BAI
ADVISOR: MONTESI, SPRING 2017

MASTERS GRADUATES

THOMAS DOODY
ADVISOR: KAUSHAL, SUMMER 2017

AUSTIN GION
ADVISOR: CANDELA/PICCOLI, FALL 2017

MITCHELL HALLER
ADVISOR: WALKER, SUMMER 2017

JIANGYI HOU
ADVISOR: ZHU, SPRING 2017

WILLIAM KIBIKAS
ADVISOR: ZHU, SUMMER 2017

ALEXIS MARTONE
ADVISOR: MONTESI, SPRING 2017

(L-R) Kyle Ludwig, Foteine Dimitracopoulos, Nathan Bailey, Patrick Deery, Luke Councell, Mark Wong, Adam Santoroski, Justine Grabiec, Dakota Sparks, Joseph Browning.

Senior Thesis

The Department of Geology senior thesis program, coordinated by **Prof. 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): 2016/2017 Academic Year

Bailey, Nathan. Effects of Deicing Agents on Stream Water Chemistry *(Advisor: Kaushal)*; **Bowen, Melody**. A Phylogenetic Comparative Analysis of Coelacanthiform Environmental Distributions through the Fossil Record *(Advisor(s): Merck/Holtz)*; **Browning, Joseph**. Origin of Tourmaline in the Setters Formation, Maryland: Evidence from Major and Trace Element, Boron Isotope, and Rare Earth Element Characteristics *(Advisors: Piccoli/Ash)*; **Councell, Luke**. Hydrothermal Formation of Unakite in the Blue Ridge Mountains, Virginia: A Geochemical Analysis *(Advisors: Piccoli/Ash)*; **Deery, Patrick**. The Influence of Gravel Bars on Urban Water Quality, NE Branch of the Anacostia River *(Advisor: Prestegaard)*; **Dimitracopoulos, Foteine**. Analysis of Convection Cells on Sputnik Planum on Pluto *(Advisor: Prestegaard/Schmerr)*; **Gaal, Joshua**. Ceres: The Evolution of the Interior and Surface *(Advisor: Schmerr)*; **Grabiec, Justine.** Insights into the formation of the Cottonwood Canyon fault in the Catalina Schist *(Advisors: Penniston-Dorland/Walker/French)*; **Ludwig, Kyle**. Highly siderophile element abundances and ^{187}Re-^{187}Os isotope systematics of Gorgona Island komatiites and Costa Rican picrites *(Advisor: Walker/Puchtel/Bermingham)*; **Santoroski, Adam**. Limitations of Magnesium Isotope Fractionation Geothermometry Determined Using Laser Ablation of Eclogite from Zermatt-Saas *(Advisor: Ash/McDonough/Penniston-Dorland)*; **Sparks, Dakota**. Quantifying Differences in Turbulence Between Alluvial and Bedrock Streams Using Analyses of Seismic Noise *(Advisors: Prestegaard/Lekic)*; **Wong, Mark**. Sulfur Dioxide Oxidation and Isotope Fractionation as a Function of pH *(Advisor: Farquhar/Wu).*

To see the posters from this year's presentations and lists of theses over the past 39 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.

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:

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Photo by Professor Alan J. Kaufman

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Front Row, (l-r): Philip Piccoli, Ann Wylie, James Farquhar, Philip Candela, Sarah Penniston-Dorland, John Merck, Thomas Holtz, Ricardo Arevalo, Laurent Montesi, Igor Puchtel, Richard Ash, Sujay Kaushal, Richard Walker, Mong-Han Huang, Michael Evans, Nicholas Schmerr, Lina Ecchevaria, William McDonough, Vedran Lekic, Alan Jay Kaufman

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