

GeoGram

A publication of
The University
of Maryland
Department of
Geology
2014

LETTER FROM THE CHAIR

Dear Alumni and Friends,



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The theme for the past year is one of change. We welcomed a talented new Assistant Professor, **Dr. Nicholas Schmerr**, a creative seismologist who studies the interior of Earth and other planets. Nick has studied the Moon's seismic record and reinterpreted its deep structure. He is an investigator in the upcoming InSight Mission to Mars, which will place a seismometer on that planet's surface in order to image the planet's interior (see p. 8 in this issue).

This year also saw the retirement of Maryland's iconic **Ann Wylie**. Over the past 15 years Ann has served in the highest level leadership positions at our University, most recently as Senior Vice President and Provost and interim Head of the Division of Information Technology. Fortunately, Ann has agreed to stay on in an emerita position where she will continue her research and will also continue in alumni outreach (see p. 2).

Sadly, this year saw the passing of **E-an Zen**, who served as a faculty member in our department following his retirement from the USGS. The GSA has established an E-an Zen fund in his honor.

There's also been some change in our staff. We were sad to say goodbye to **Sandy Romeo**, who served the Geochemistry denizens and many visitors for over fourteen years. Sandy retired so that she can help care for her adorable grandson. **Nicole (Siyu) Shan** is now serving in a similar capacity and

is a welcome new addition to our staff.

And change is occurring in our physical presence. After more than a decade, the faculty, students and staff currently housed in the Computer and Space Sciences building will relocate into newly renovated space adjacent to our current space in the Chemistry Building. This very welcome turn of events is anticipated to lead to increased collaborations.

But some things have not changed. Our faculty and students continue to garner prestigious awards. Four faculty members have received top honors at the University and nationally. **Jay Kaufman** joined the ranks of Distinguished Scholar-Teachers, **Ann Wylie** is the first ever Geology faculty member to receive the President's Medal – the highest award made at our University, **Vedran Lekic** received a prestigious Packard Fellowship, and **James Farquhar** received the Epstein Science Innovation Award from the European Association of Geochemistry. Finally, the U.S. News and World Report has just issued a new ranking of global academic institutions. This new ranking system is more quantitative than past rankings and uses bibliometric measures, including publications and citations, as well as indicators for global and regional reputation in specific subject areas. Geosciences at Maryland ranks #15 in the world, and #6 amongst U.S. public universities. This year of change has truly been a great year at Maryland

Roberta Rudnick
11-21-2014

PROFESSOR ANN WYLIE

BY
DISTINGUISHED UNIVERSITY PROFESSOR
AND CHAIR
ROBERTA RUDNICK
&
PROFESSOR PHIL CANDELA

Professor Ann Wylie retired in October after serving more than 42 years at the University of Maryland. Following her PhD at Columbia University, Ann was hired in 1972 as an Assistant Professor in the Department of Agronomy, before there was a Geology Department. She was, thus, one of the founding faculty, along with **Galt Siegrist**, **Pete Stifel**, **Tony Segovia**, and **Jerry Weidner**, when the Department of Geology was formed in 1973. Ann is a mineralogist and economic geologist by training and she is a world leader in the geology and mineralogy of minerals of asbestiform and related habits and their possible health affects. She is an expert on the mineralogy of tremolite-actinolite amphibole solid solutions, and she has also played a significant role in understanding the origin and plate tectonic context of ultramafic bodies (derived from the Earth's



(L-R) Galt Siegrist, Jerry Weidner, Ann Wylie and Pete Stifel at a celebration in honor of Galt's 80th birthday...

mantle) and their related metallic ores that occur within the Maryland Piedmont. Ann mentored a large number of students as a Professor, senior thesis advisor, and graduate advisor. Since 1998 Ann served in various senior administrative roles at the University, including as Interim Dean of the Graduate School, where she instituted the dissertation fellowships that now bear her name, and as Senior Vice President and Provost. Ann's accomplishments have been recognized by Fellowship in the Geological Society of

After 42 years of dedicated service to the University, Ann Wylie retires.

America, the Distinguished Scholar-Teacher Award, the University's Outstanding Woman of the Year award and the President's Medal. Ann is now an emeritus Professor and will continue her research and work with alumni outreach in the Department. Happy retirement, Ann!

LIPELLA GOLF TOURNAMENT

By
Senior Research Scientist Phil Piccoli

Fore! Several members of the department participated in the **Marc Lipella 3rd Annual Golf Tournament** on June 13th. The tournament took place at the award-winning Black Rock Golf Course in Hagerstown, Maryland. **Bill McDonough**, **Gus Kingman**, **Ann Wylie** and **Phil Piccoli** played links while **Roberta Rudnick** served as photographer and head cheerleader. This was the second year the department fielded a team.

Marc graduated with a degree in Geology in 2004 (he completed his senior thesis with **Roberta Rudnick**, **William McDonough**, **Richard Ash** and **Phil Piccoli**). He subsequently worked as a research assistant at the National Museum of Natural History at the Smithsonian Institution while he also pursued his love of music as lead guitarist in the group Zen Black. Tragically, Marc passed away in September of 2011. His parents have set up a foundation in his honor to provide scholarships to worthy students. Since its inception, the foundation has awarded 7 scholarships to our undergraduates in memory of Marc.

Twenty-six teams participated in the shotgun-style match, with proceeds benefitting the Marc Lipella Foundation Scholarship Fund. Marc's high school and

college friends, band mates, neighbors and relatives all gathered to honor Marc in this jovial event. The round of golf was followed by a hearty meal, the competitive banter that often accompanies competitive sports, and stories about Marc. It was good to hear stories about Marc's friendly nature outside of his Geology family.

Golf anyone? The tournament will take place again next year on June 12th, 2015. If you want to participate, be sure to let us know. Alternatively, if you wish to contribute you can do so by sending donations to:

Marc Lipella Foundation, Inc.
17904 Garden Spot Drive
Hagerstown, MD 21740

TO THE ALUMNI OF THE GEOLOGY DEPARTMENT AT THE UNIVERSITY OF MARYLAND

It is my pleasure to announce the formation of an Alumni Council for the Department of Geology. On May 2, 2014, a day long meeting of interested alumni was held on campus at the department's location.

The following are the names of the attendees and principal results of that meeting:

Willy Accame (BS 1980), Robert Beauchamp (PhD 1988), Amina DeHarde (MS 2001), Mark Eisner (BS 1983), Carmela Garzione (BS 1994), Robert Glazier (BS 1981), David Grogan (BS 1981), John M. Libert (MS 1982), Phil Piccoli (PhD 1992)

Principal Results and Actions to be Taken

The Advisory Council was very enthusiastic about developing objectives and an agenda to foster fruitful and ongoing communication between and among alumni, the Alumni Council, geology students and the Department of Geology.

The Alumni Council felt that the Alumni are in a position to be very helpful in assisting geology graduates in the following manner:

1. Assist in placing students in meaningful jobs.
2. Identify and promote specific networks that can assist graduating geologists in identifying job opportunities.
3. Encourage fellow alumni to participate in the Department of Geology functions and interests, where appropriate.

The Alumni Council also identified ways to bring Alumni, students and faculty together at special events as follows:

1. Senior Thesis Presentation Day (Late April, Early May and Early December).
2. Maryland (MD) Day (Last Saturday in April)
3. Formation of a Department Founders Fund to honor early founders of the department

The Alumni Council also feels that in the future, a regional alumnus coordinator should be identified in areas of high alumni numbers. The coordinator would be willing to engage in departmental activities, such as building relationships with outside organizations, seeking advice, and fund raising.

For your information, the alumni web page in geology is available from the web site www.geol.umd.edu. Any direct queries can be made to: geo-aluminfo@umd.edu.

The Alumni Council fully acknowledges the importance of the alumni in helping to sustain the growth and health of the Geology Department at UMD. It is also felt that these initial steps by the alumni to recognize and support the geology graduates will offer them encouragement to strive for excellence and success in geology.

We look forward to hearing from you about our effort to reach out to the alumni to assist geology graduates in identifying employment opportunities.

Thank you:
Robert G. Beauchamp (PhD)
Chair, Alumni Council



(L-R) Bill McDonough, Gus Kingman, Ann Wylie, Phil Piccoli on the links at the 3rd annual Marc Lipella tournament and fundraiser. (Note the sign on the right should read: "University of Maryland Geology & CAI inclusions – the topic of Marc's senior thesis).

Calling All Alums!! PHOTO CONTEST ANNOUNCEMENT

It was suggested by one of our graduates, Dave Grogan, that we have a photo contest. We are looking for photos having a geology theme. Photos do not necessarily have to contain content from your time in the Department. We hope to use the photos in future mailings to our alums.

Electronic copies of photos, with short descriptions about the content, can be sent to: geo-aluminfo@umd.edu. Hard copies of photos can be sent to the Department. Every effort will be made to return all photos.

Photos will be evaluated and the winner will receive a highly coveted prize. Evaluation of the photos will take place on January 15.

FACULTY HIGHLIGHT

PHIL CANDELA MODERN MAJOR GENERAL

BY
PROFESSOR ALAN J. KAUFMAN

Since 1996 when **Philip A. Candela** took the reins of the Senior Thesis Program from Pete Stifel, there has been no single faculty member that has impacted our students and alumni more. Candela, our undergraduate Major-General, has strategically guided nearly 150 students through the year-long capstone course continuously for the past 18 years, including 35 students that he has mentored in projects since he joined the Geology Department.

However, it appears that Phil has been unwittingly training to lead the senior thesis program since his high school days when he did his own senior thesis on the Staten Island serpentinite – the metamorphic product of low temperature hydration of mantle-derived ultramafic rock – from his own home town. At the insistence of his high school mentors, he submitted his research paper to the Westinghouse Science Talent Search (now the Intel International Science Talent Search) and was named a semi-finalist. This work propelled Candela towards Brooklyn College where he double majored in Geology and Chemistry as an undergraduate, and beyond for graduate work at Harvard University. There he applied the principles of physical geochemistry and thermodynamics to the study of ore deposits. In Cambridge, Phil was highly influenced by his world-renown advisor **Dick Holland** and other geoscience luminaries, including **Steve Gould**, **Jim Thompson**, and **Ulrich Peterson**.

Before completing his Ph.D. in 1982 on copper and molybdenum partitioning in silicate melt-aqueous systems, Candela met with **Luke Chang**, the then Chair of the Geology Department at the University of Maryland, who revealed his vision to create a first-rate research department. “He asked me



I am the very model of a
MODERN
Major-General,
I've information volatile,
aqueous, and mineral...

if I would be interested in helping to build a Graduate Program...based on the strengths of petrology, mineralogy, and chemistry,” Phil said. The excitement of Luke’s vision, the birth of the Graduate Program, and the potential for a significant departmental phase change ultimately brought Candela to College Park.

“By the time September 1st rolled around [after moving here less than a month earlier], I had five graduate students, no grants, an AA spectrophotometer, and about \$20K in startup money,” said Candela. Phil benefitted from **Jerry Weidner’s** invitation to treat the experimental laboratory (which had been assembled from NASA parts left over at Goddard after the move to Houston) as if were his own. Many of Candela’s early students studied ore deposits in Maryland, including **Todd Burke**, who was advised by Phil and his own faculty mentor **Ann Wylie**, this year’s President’s Medalist. Ann said, “Phil’s excellence and dedication as a teacher and his impact as an accomplished researcher set a high bar for the department in the early years.”

In 1996, just as **Pete Stifel** was retiring, Phil

was made an offer by then Chair **Mike Brown** that he couldn’t refuse – although the senior thesis program appeared to be a complicated enterprise. Brown said, “Phil has directed the Senior Thesis program since Pete (Stifel) retired. This requires a rare combination of academic leadership and administrative skill, and his careful supervision for the past eighteen years of one of the most successful elements of our BS program should not be underestimated.” Phil waxed that at the time it seemed that there were many, many ways to fail. “Over the first few years I spent a lot of time worrying about the program...but there are no surprises anymore,” he said. Clearly the senior thesis is one of the great things that we give to our students. “My role is to set up the stepping stones for students to move forward in their academic careers, or whatever may come later.” Phil beamed when he spoke of wanting to provide students with transferable skills, so that they are successful in whatever field they choose.

The bar of expectation for the Senior Thesis program has risen through the years in parallel with the meteoric ascent of the Geology Department to national and international ranking. Candela believes that the Senior Thesis reflects the evolution of the department, with more research-oriented faculty and a wide range of sophisticated instrumentation, but with continued focus on the educational enterprise. Phil’s past and current students speak highly of him as a model major-general. **Sean Keyser**, now a geologist for Energy Corporation of America, said, “Dr. Candela is a truly dedicated professor who strives to always ensure that he teaches and mentors each of his students with the highest degree of courtesy, professionalism and truth...He is like the Mr. Miyagi of Geology.”

Phil Candela has been a continuous force in the Geology Department for decades. He has been instrumental in the hiring of critical research faculty as well as the Chair. He has promoted excellence at all levels and been a role model for faculty and students alike. His commitment to undergraduates and the senior thesis program keeps our undergraduate program extraordinarily strong – a model of a Major Modern-General for our university.

DEPARTMENTAL FIELD TRIP

By
SENIOR RESEARCH SCIENTIST PHIL PICCOLI

Caving anyone? Over the Labor Day weekend, members of the department participated in their annual field trip. The trip was organized by the graduate students, with **Mark Larson** and **Harry Lisabeth** tackling the majority of the logistics. The first stop was to see alum **Callan Bentley** (M.S. 2004), now a professor at Northern Virginia Community College. Callan is the 2014 recipient of the Biggs Award for Excellence in Earth Science Teaching, awarded at the GSA meeting in October.

Callan welcomed the group of 35 into his home located on the eastern limb of the Massanutten syncline. Callan gave the group a detailed overview that provided the framework for much of the remainder of the trip. Discussions about deformation and timing, bentonites and not Bentonville, were interspersed with discussions about semantics (is it Taconic or Taconian Orogeny?). All of this was infused with tidbits of local historical sites that we would see on our tour of Fort Valley as we progressed south.

After a drive down the valley, we arrived at the trailhead to Veach Gap. A short hike took us to Silurian age quartz arenites of the Massanutten formation, deformed during the Alleghenian, and exposed as a series of slightly asymmetric, gently plunging parasitic folds. Discussions followed about local and regional deformation, what the regularity of the folds was telling us, and possibilities about the origin of the blue quartz present in some float.

After a lunch stop in Woodstock, the caravan again headed south towards Blacksburg to an exposure along the banks of the New River near Blacksburg. At the site, there was evidence of one of the major Appalachian thrust systems, the Pulaski fault. Extensive fault breccia (gouge) was exposed in a complex zone of limited outcrop separated by gentle vegetation-covered valleys. The Pulaski thrust fault system has been suggested to account for ~100 km displacement, but estimates of extensive displacement at this site were difficult to ascertain.



(L-R) Joseph Schools, Al Greaney, Rich Gaschnig, Michelle Beck, Harry Lisabeth, Ben Belzer, Willie Nicholas, Amy McAdam, Erin Cunningham, Scott Wipperfurth.

A short drive ended at the Bat Ranch, a property along the bank of Sinking Creek in southwest Virginia. The following day, graduate students Mark Larson and Huan Cui lectured on cave formation and structure. Following the lectures, small groups departed for tours of the caves. The owner of the Bat Camp has access to three caves: Tawney's, Link's Cave and Smokehole. The cave decorations were extensive. After several hours, attendees exited the caves tired, wet and muddy. Stories were told, and after dinner, several grad students entertained the weary cavers with guitars and drums. Overall, it was a very successful trip. The efforts of the grad students were appreciated by all. Who is up next?

GEOLOGY CLUB

By
Maddie White and Ben Belzer (co-Presidents)



Geology Club members at the top of Old Rag Mountain, Shenandoah National Park, after completing the 2,500' ascent. (L-R) Joe Schools, Maddie White, Elizabeth Lee, Adele Lu, Mark Larson, Nivea Magalhaes, Kale Johnson, Ben Belzer.

The Geology Club is approaching its 35th year. The Club, started by **Willy Accame** (1980), has recently been invigorated and is meeting weekly. The Club is focusing on creating an open environment in which undergraduates, graduates, alumni, and faculty can share knowledge and interests in a way that benefits all those involved. Some of the ways the Club plans to accomplish this goal includes going on trips, hosting speakers, and having meetings where anyone's suggestions and ideas can be heard. So far this year the Club has gone on field trips, started tutoring hours where students in the intro classes can come for help, and has enrolled enough members to apply for University funding. Members of the Geology Club have a lot of great ideas and trips planned for the future and hope to make the Club an integral part of the Department.

Undergraduate and Graduate Club members

are looking to take part in a variety of adventures this academic year. In October, the Club took an overnight trip to Matoaka Beach Cabins in southern Maryland. The campsite was within easy striking distance of Calvert Cliffs and the Calvert Marine Museum, where we were treated to a behind-the-scenes tour by alum **John Nance** (2013) who is an Assistant Curator at the facility.

Earlier this term, club members took advantage of the balmy early Fall weather to climb Old Rag in Shenandoah National Park. **Phil Piccoli** (1992) spoke to club members about the geology along the ride to Virginia, and the charnockites, unakites, nelsonites and opferkessels that contribute to the interesting geology in the park. The 10 mile hike, and 2500' ascent, left students with the sense of accomplishment. The view from the top was spectacular!

GRADUATE STUDENT HIGHLIGHT

KEVIN MILLER

BY

ASSOCIATE PROFESSOR WENLU ZHU

Sometimes, the real world is not enough. In his research, **Kevin Miller** seeks to go beyond the limits of direct measurements by simulating the physical properties of digital rocks based on real samples. For Kevin, a fan of science fiction because it is “grounded by sound physics but is not wholly bounded by it”, this work provides the perfect balance between pragmatism and imagination.

After graduating with a degree in Physics from UMD, Kevin joined the Department of Geology in Fall 2010 to learn about and develop tools that allow scientists to peer into Earth processes. For his PhD thesis, Kevin decided to work on melt extraction and mantle dynamics at mid-ocean ridges, the main site of volcanism on Earth, under the supervision of **Drs. Wen-lu Zhu** and **Laurent Montesi**. Kevin has travelled widely to carry out his work, regularly visiting the Woods Hole Oceanographic Institution on Cape Cod, Massachusetts, to synthesize partially molten samples of various compositions at high pressure and temperature using a piston-cylinder apparatus. He has also made several trips to the Advanced Photon Source in the Argonne National Lab outside Chicago, Illinois, where the rock samples were imaged



Kevin Miller with his digital partially molten rock. The distribution of partial melt is shown in gray in the 3-D projection, and the flow lines (red) are calculated from the virtual permeability measurements.

at the state-of-the-art X-ray synchrotron facility. Using various data analysis and simulation tools, Kevin obtained stunning 3-D images of melt distribution of the partially molten rocks (see photo). These high-resolution, 3-D microstructures form the basis of the digital rocks, grounded by reality, that Kevin is studying. Not completely bounded by reality, he conducts virtual experiments through computer simulations on the digital rocks to extend our ability to estimate physical properties on natural systems at mantle conditions. Next, Kevin will bring the digital rocks back to reality: he plans on building alter egos of the partially molten samples using 3-D printing, replacing the melt phase with voids so that fluid flow experiments can be conducted in reality.

In the past few years, Kevin worked with one of the largest man-made imaging tools (the synchrotron), built his own digital rocks, and collected a few trophies: the Ann G. Wylie Dissertation Fellowship, the 2012 American Federation of Mineralogical Societies Graduate Student Award, as well as the Best Graduate Student Talk Award (pre-candidacy) in 2012 and this year's Best Graduate Student Talk Award (post-candidacy). This is just the beginning of his journey; Kevin is looking forward to a career in which “[his] imagination is stretched to the utmost, not, as in fiction, to imagine things which are not really there, but just to comprehend those things which ‘are’ there” (---Richard Feynman).

2013 DISTINGUISHED ALUM

BY PROFESSOR PHIL CANDELA



Geology Distinguished Alumni Dr. Eliot Atekwana.

We are pleased to have **Dr. Eliot Atekwana** as our most recent Distinguished alumnus. Dr. Atekwana graduated with a BS in Geology from the University of Maryland in 1984. He then went on to obtain a Master's Degree in Geology from Howard University in 1987 and a PhD in Hydrogeology in 1996 from Western Michigan University. Dr. Atekwana is now a Professor of Geology at the Boone Pickens School of Geology at Oklahoma State University (OSU) where he has worked since 2006. He

has graduated several PhD and MS students and has engaged tens of undergraduates in his research.

Dr. Atekwana's honors include his election as a Fellow of the Geological Society of America, Alumni of the year in the Department of Geosciences at WMU, the Sterling L. (Bud) Burks Award for Outstanding Environmental Research at OSU, and the Governor of Indiana Environmental Award. Last but not least, Eliot is married with three children, and his wife is a fellow geoscience faculty member at OSU.



Demonstrating her geological strength, Emma hefts a piece of lava at the edge of the volcanic cone at Panum Crater in the Mono-Inyo Range, eastern California.

UNDERGRADUATE STUDENT HIGHLIGHT

EMMA McCONVILLE

BY
PROFESSOR PHIL CANDELA

One day in 2013, **Emma McConville** was studying the various pictures, posters and pamphlets that adorn the walls outside the experimental geology lab, and she happened to stop by to ask **Phil Piccoli** and me some questions. We turned Emma's questions around, and asked her about her interests. Emma's response was a bit out of the ordinary: she said she wanted to start her own geothermal energy company. One of my favorite sayings is "if you want to solve a problem, start a company", so her answer resonated with me immediately. She initially enrolled as a non-degree seeking student, but after some courses, and further discussions with **John Merck** and others, Emma became a Geology major in the Spring of 2014. She says "the past year has been absolutely amazing. I have learned so much from the geology faculty and my peers."

Queried about how she got to this point in her educational career, Emma responds: "I saw my first geothermal power plant in the Atacama Desert in Chile at the age of thirteen. Since then I have been profoundly curious about geology, and about the Earth's ability to generate electricity in particular." She discovered her passion for geology early in life, and after a baccalaureate in Economics and Philosophy at the highly selective Claremont McKenna College (followed by a Fulbright Fellowship in Mexico City) she decided to become a geologist.

In June Emma participated in the Geothermal Energy Academy offered

by the University of Nevada-Reno. From there she visited the famous Long Valley Caldera of California where she toured the volcanic landscape, examined volcanic rocks and structures, observed hot springs, and visited the Casa Diablo geothermal power plant. Later in the summer she worked at the Geothermal Energy Association, contributing to publications and attending conferences and workshops sponsored by the U.S. Department of Energy. This semester she has been honored with the Marc Lipella Memorial Scholarship, and she is currently an undergraduate mentor for Girls Excelling in Math and Science at Buck Lodge Middle School. She says she has also had the privilege of using the Plasma Mass Spectrometry Lab with Richard Ash and is looking forward to working in the Electron Probe Microanalyzer Lab with Phil Piccoli.

She is quite excited to begin work on her senior thesis project this spring. In collaboration with **Professor Joe Moore** of the University of Utah and advised by Phil Piccoli and me, Emma will study propylitically altered rocks in drill core from a geothermal field on the flank of the active Galunggung Volcano, West Java, to determine the evolution of the geothermal system that seethes and churns below the flanks of the volcano. Appropriately, she is also interested in geophysics, especially rock mechanics and fracture networks. Her plan is to complete her research and graduate in December, 2015. Graduate study is in her immediate future, and of course there is that new geothermal energy venture on the horizon.

ALUMNI NEWS

Callan Bentley, M.S., 2004

Callan received the Biggs Award for excellence in Earth science teaching at the Annual GSA meeting.

Mark Frank, Ph.D., 2001

Mark was selected as one of two COMPRES Distinguished Lecturers for 2013-2014.

M. Eugenia Leone Gold, B.S., 2008

Eugenia was chosen as the Dawson Pre-Doctoral Fellowship Grant winner for 2014 by the Society of Vertebrate Paleontology. She is currently completing her doctoral research at the Richard Gilder Graduate School of the American Museum of Natural History. Her Masters Thesis research was published earlier this year as Gold et al. (2014) An expanded combined evidence approach to the Gavialis problem using geometric morphometric data from crocodylian braincases and eustachian systems. PLoS ONE 9(9): e105793. Doi:10.1371/journal.pone.0105793

Yu Huang, Ph.D., 2013

Yu received the inaugural best student paper award given by the Geology Department for his paper: Huang et al. (2013) Reference Earth model for the heat producing elements and associated geoneutrino flux, G-cubed 14 (6): 2003-2029, doi: 10.1002/ggge.20129.

Palma Jarboe, M.S., 2014

Palma's abstract, Supercritical CO₂ Extraction of Hydrocarbons from the Marcellus, was presented as a talk at the Annual GSA conference in Vancouver, Canada.

Ryan Kerrigan, Ph.D., 2011

Ryan has accepted a tenure-track position at the University of Pittsburgh at Johnstown.

John Nance, B.S., 2013

John has accepted a position as Assistant Curator of Paleontology at the Calvert Marine Museum. In that position, John was part of a team that helped to identify and extract the first intact snaggletooth shark skeleton.

Marcie Occhi, M.S., 2009

Marcie has accepted a position for the Division of Geology and Mineral Resources (Virginia Department of Mines, Minerals and Energy) as a full-time geologic mapper of the Piedmont, Coastal Plain and Valley and Ridge provinces. *(continued on page 10)*

RESEARCH FOCUS

BY

ASSISTANT PROFESSOR NICHOLAS SCHMERR

How do the physical and chemical properties of materials at the small-scales of rocks, minerals, and ices relate to the large-scale evolution and dynamics of planetary surfaces and interiors? That is the research focus of my group. We use seismological and geophysical data to decipher the properties of geological materials and use our findings to investigate the formation, dynamics, and evolution of planetary interiors. This research takes place both in the computer laboratory and out in the field, taking advantage of the abundant data provided by seismometers deployed around the globe, as well as developing and deploying new instrumentation to consider targeted research questions about the interiors of planets. We work on many different objects, with current projects focusing on the Earth, the Moon, Mars, Jupiter's moon Europa, and Saturn's moon Enceladus.

The terrestrial component of research in our group centers on the seismological determination of the depth and sharpness of elastic contrasts that arise from high-pressure and temperature solid-to-solid phase changes in minerals, rheological transitions in material properties, the presence (or absence) of melt, and the chemical differentiation and stratification inside the Earth. We are developing multiple techniques for using large, high-quality, broadband, seismological array recordings of earthquakes to amplify low amplitude signals out of the background noise, both from existing datasets and new datasets collected in temporary field deployments of seismic arrays. Master's student **Anthony Mautino** is currently developing a new seismological technique that borrows from exploration seismology-based approaches to image the detailed structure of phase transitions within the Earth. Our group recently added Postdoctoral scientist Andy Cai, who will be modeling the detailed behavior of melt migration at depth within the Earth. His research is particularly relevant to our recent seismological detection of a discontinuity associated with the lithosphere-asthenosphere boundary that indicates melt may be present at the interface.

Our group is also interested in developing and



Installation of broadband seismometers in British Columbia.

applying Earth-based seismological techniques to understand the largely unexplored interiors of other objects in the Solar System. Just as the seismometers deployed on the Moon by the Apollo astronauts are still revolutionizing our understanding of the interior of the Moon, future deployments of seismometers will revolutionize our understanding of the interiors of the other objects in the Solar System. The group's planetary research uses synthetic wave propagation through thermodynamically and petrophysically constructed models to make predictions for the expected scattering, body, and surface wave arrivals of seismic energy propagating within planetary interiors. These models are run on the NASA Discover and University of Maryland Deep Thought II supercomputers and are being used to plan for future seismological exploration of the Solar System, such as the upcoming seismometer that will be deployed by the upcoming NASA InSight mission. Current projects in this research focus include modeling the scattering behavior of seismic waves propagating in the lunar megaregolith, and identifying the seismic

signature of recently formed impact craters on Mars and the Moon.

Finally, our group is investigating in the signatures of elastic waves propagating in ice on Earth and other icy worlds. In collaboration with Goddard Space Flight Center scientists, we are using seismology to determine the deformation processes on the surfaces of Europa, Enceladus, and other ice-laden objects, including the cryosphere of Earth. We are using synthetic wave propagation codes to model the seismic response of ice-covered oceans for satellites such as Europa, and comparing the results to an analog seismic environment on the Ross Sea ice shelf in Antarctica. Early next year, undergraduate student Lynn Montgomery and I will be deploying seismic instrumentation on the eastern Greenland ice sheet to study the hydrology of a shallow glacial aquifer; this presents an opportunity to further study wave propagation in ice and other unusual seismic environments, as well as understand the melting and degradation of continental ice that is affecting and our changing climate.



VED LEKIC
PACKARD FELLOWSHIP
RECIPIENT

Ved Lekic was chosen as a 2014 Packard Fellow! These highly prestigious fellowships provide \$875K over five years to early career scientists to provide "freedom to take risks and explore new frontiers".

There have only been five Packard Fellowships awarded to Maryland faculty in the history of the program and the last such awards were made way back in 2001.

<http://www.packard.org/what-we-fund/conservation-and-science/science/packard-fellowships-for-science-and-engineering/>

RECOGNITION & AWARDS

Faculty

James Farquhar received the 2014 Samuel Epstein Science Innovation Award from the European Association of Geochemistry. (Pictured below).

Tom Holtz has been elected to membership of the Scientific Council of the Maryland Academy of Sciences (the body that runs the Maryland Science Center <http://www.mdsci.org/> in Baltimore).

Jay Kaufman was selected to be a Distinguished Scholar-Teacher this academic year (2014-2015).

Sujay Kaushal was awarded the 2014 Council of the Environment Jr Faculty award. Collectively, Sujay and his colleagues have contributed significantly to environmental issues that have served to advance our state of knowledge and, in turn, have raised the profile and visibility of the university.

Ved Lekic received a prestigious NSF CAREER grant, was selected as an EarthScope Speaker for the 2014-2015 series and received a Packard Fellowship (see box).

Nicholas Schmerr received the Doornbos Memorial Prize. The prize is presented to a young scientist by the Committee on Studies of the Earth's Deep Interior (SEDI), in association with their biennial meetings, for outstanding work on the Earth's deep interior. It is given in honor of the Dutch seismologist, Durk Doornbos.

Ann Wylie received the President's Medal -- the highest award made by the University!



Students

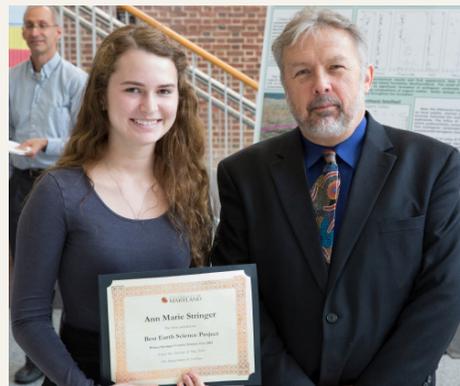
Huan Cui (advisor: Kaufman) was awarded an International Association of Sedimentologists Research Grant; the CMNS Dean's Teaching Assistant Award recipient for 2013-2014; a 2014 GSA Research grant for his proposal titled "Testing the origin of the enigmatic strontium isotope ($^{87}\text{Sr}/^{86}\text{Sr}$) anomaly in Ediacaran carbonates of Saudi Arabia."; a graduate research grant from Sigma Xi - The Scientific Research Society, for his proposal titled "The Hüttenberg Excursion: Carbon and Sulfur Isotopic Clues to the Onset of Cryogenian Glaciation?"; a Marilyn Atwater memorial grant from American Association of Petroleum Geologists for his proposal titled "Reconstructing biogeochemical carbon and sulfur cycling in the Ediacaran Dengying Formation, China."; an Exploration Fund grant of \$3000 from the Explorers Club of New York City for his project "Field Investigation of Earth's Oldest Methane Seep Deposits in South China; and a Mineralogical Society of America (MSA) Grant for Student Research in Mineralogy and Petrology for his proposal titled "Linking authigenic carbonate mineralization in marine sediments to the largest carbon isotope excursion in Earth history."

Tom Doody (advisor: Kaushal) received a USGS/NAGT summer internship. Tom worked on the biogeochemistry and hydrology of river floodplains.

Chao Gao (advisor: Lekic) received an international Teaching Assistant award.

Stephanie Johnston (advisor: Montes) was recognized at the Lunar and Planetary Science Conference for her work with VEXAG (Venus Exploration and Analysis Group).

Ming Tang (advisors: McDonough/Rudnick) received a GSA research grant to study Li isotopes in zircon, as well as a supplement from the Mineralogy, Geochemistry, Petrology and Volcanology Division that doubles the research funds.



Mark Larson (advisor: Montes) participated in the East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI). He was awarded a fellowship to study in Japan this summer with Kyoko Okino at the University of Tokyo

Michael Pennino (advisor: Kaushal) received a NatureNet Science Fellowship. Michael will be joining the Department of Civil and Environmental Engineering at Princeton a postdoctoral fellow working on urban hydrology.

Carolyn Plank (advisor: Prestegard) received both a Geological Society of America and a UMD graduate school summer research award for a study of Climatic and geomorphic controls on flood discharge- Basin area relationships.

Rose Smith (advisor: Kaushal) received a summer graduate fellowship from the Maryland Water Resources Research Center.

Yadviga Zhelezinskaia (advisors: Farquhar/Kaufman) was awarded a Jacob K. Goldhaber Travel Grant, as well as an international Teaching Assistant award.

Emma McConville, Albert Chen, Ben Belzer and **Kalev Hantsoo** were all recipients of the Marc Lipella Memorial Scholarship.

Shayna Quidas was the recipient of the Mineralogical Society of America Undergraduate Prize for 2014.

Eleanor Roosevelt High School Student **Ann Stinger** (pictured with John Merck above) won the 2014 Geology Department prize for Best Earth Science --related project entitled "Alaskan Corn as an Isotopic Working Standard" at the Prince George's County Science Fair.

ALUMNI NEWS cont...

Adam Simon, Ph.D. 2003

Adam joined the faculty of the Department of Earth and Environmental Sciences at the University of Michigan as an Associate Professor.

Gary Solar, Ph.D., 1999

Gary will assume the position as Chair of the Board of the AGU-sponsored organization known as the AGU Heads and Chairs of Earth and Space Science Departments. This position is a one year term and the organization is primarily responsible for the annual workshop held at the Fall AGU meeting.

Fang-Zhen Teng, Ph.D., 2005

Fang-Zhen received the 2014 MSA Award for outstanding young scientists. Fang-Zhen is an Associate Professor at the University of Washington.

Lisa Walsh, Ph.D., 2013

The GEOL110 activity on Topographic Maps that Lisa shared at a SERC Workshop in 2011 received an "Exemplary" rating and was accepted into the On the Cutting Edge Exemplary Teaching Activity collection.



Senior thesis students, Spring 2014. (L-R) Kalev Hantsoo; Tom Doody; Adam McKeeby; Will Junkin; Thomas Braga; Eric Fowler; Michael Ream.

SENIOR THESIS

The Department of Geology senior thesis program, coordinated by **Phil Candela** for 18 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):
2013/2014 Academic Year

Bowman, Noah. Developing an Apparatus to Study the Kinetics of Sulfide Oxidation (Advisors: Farquhar/Eldridge); **Braga, Thomas.** Analyzing the Effect of Olivine Mineralization on the Strength of the Oceanic Lithosphere (Advisor: Zhu); **Doody, Tom.** Potential Impacts of Anthropogenic Impervious Surfaces on Alkalinization in Urban Watersheds (Advisor: Kaushal); **Fowler, Eric.** Carbon and Nitrogen Abundance, Isotope Fractionation, and

Aquatic vegetation decay rates in Patuxent Freshwater Wetlands (Advisors: Prestegard / Kaufman); **Hantsoo, Kalev.** Did Bioturbation Shorten the Fuse to the Cambrian Explosion? (Advisors: Kaufman/Cui); **Junkin, Will.** Variations in magma supply along ~900 km² of the Mid- Atlantic Ridge at 16.5°N (Advisors: Montesi/ Zhu/Smith); **Kayser, Sean.** Partitioning of Indium Between Pyrrhotite and Silicate Melt (Advisors: Candela/Piccoli); **Liu, Christine.** Earthquake Magnitudes Before and After the Mineral, Virginia Event (Advisor: Montesi); **Nance, John.** Thermodynamic Properties of Indium in Hydrothermal Ore Systems (Advisors: Candela /Piccoli); **Ream, Michael.** An estimation of Titan fluid and sediment properties based on sediment transport theory (Advisor: Prestegard)

To see the posters from this year's presentations and lists of theses over the past 37 years go to <http://www.geol.umd.edu/undergraduate/seniorthesisarchive.php>.

CONGRATULATIONS TO OUR RECENT GRADUATES

DOCTORAL GRADUATES

YU HUANG

ADVISOR(S): McDONOUGH/RUDNICK. FALL 2013

MIRIAM SHARP

ADVISOR: WALKER, SPRING 2014

CHRISTOPHER YAKYMCHUK

ADVISOR: BROWN, SUMMER 2014

MASTERS GRADUATES

CAITLIN BROWN

ADVISOR: BROWN; WINTER 2013

PALMA JARBOE

ADVISOR: CANDELA, SPRING 2014

ZACHARY REEVES (M.S.)

ADVISOR: LEKIC, SPRING 2014

LEIGH ANNE ROBLE (M.S.)

ADVISOR: PENNISTON-DORLAND, FALL 2014

ANNA STATKIEWICZ (M.S.)

ADVISOR: PRESTEGAARD, SUMMER 2014

Your contributions **ARE** making a difference!

In the 2009 GeoGram we placed a “Call to Action” asking for your support... and you answered! Your generous contributions over the past five years have allowed us to provide benefits and services to our students that would not be otherwise possible. We’ve purchased petrographic microscopes for our teaching labs, provided field camp scholarships to many students in need, as well as support for student’s out-of-pocket expenses related to senior thesis projects.

As we continue to absorb significant cuts in our state support we are slowly becoming one of the elite “private” public Universities – i.e., funded primarily through non-state funding sources. It is in the context of these significant cuts that we appeal to you, our alumni and our proudest example of what we can accomplish here, and ask you to consider supporting our Department through a continuing pledge, adding us to your estate planning, or simply a one-time end of year donation. We are relying more heavily than ever on your support, which not only provides much needed funding, but also sends the signal that you like what you see in your alma matter. We are extremely grateful to the support we have received in the past year and we thank all who have donated for sharing your confidence in us.

Tax-deductable gifts to the department can be made online through the UMCP Foundation website (<http://advancement.umd.edu/giving/index.php>). Enter “Geology” in the search box in the right hand corner to ensure that your donations are allocated to the correct department. 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” in the notes section to ensure that your funds are allocated properly.

BENEFACTORS

October 2013 – November 24, 2014

Up to \$99 per annum

Anonymous
Dennis Askew II
Richard Ash
Robert G. Beauchamp
Katherine Bermingham
Kate Burgy
Irene Doody
Tom Doody
Sharon Ann Dudek
Robert B. Finkelman
John Fournelle
Heather Ferguson
Andy Frassetto
Melodie French
Nicholas Geboy
Ben Giraldo
Longlong Gou
Steven Hauck
Edwin Jacobsen
Stephanie Johnston
Mirna Lekic
Einat Lev
Laura Lisabeth
Xiaoming Liu
Nivea Magalhaes
Garrett Mitchell
Andrea Morris
Robert M. Najewicz
Sarah Penniston-Dorland
Jeanne Sauber-Rosenberg
Miriam Sharp
Barrett L. Smith
David Tana
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Daniel K. Tarkington
Mary K. Tarkington
Linda Verrill
Emily Worsham

Up to \$100 - \$250 per annum

Advanced Land & Water
Eliot A. Atekwana
Jayanth Banavar
Anne Bowden
Zhengyu Cai
Candela Consultants, LLC
Chris Dullnig
Michael Evans
Robert M. Glazier
Steven Goldstein

Judith James
Margaret Karwoski
Alan Jay Kaufman
Nicklas Kulczycki
Vedran Lekic
Adam Mansur
Brian McAdam
Suzanne McConville
Teresa McTigue
Phil Piccoli
Barry Reno
Eric Roberts
David Schmerr
Marie Schools
Henry Siegrist
Alicia Siegrist
Mark Shupe
Joseph P. Smoot
Gene Taylor
Renate Taylor
Fang-Zhen Teng
Martitia Tuttle
Robert Virta
Jianying Wang

>\$250 per annum

Michael Brown
David Grogan
Mary F. Horan
Sujay Kaushal
Katherine C. Manger
Phillip H. Manger
Bill McDonough
Laurent Montesi
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Mandip Parmar
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Billie Jo Varndell
Richard J. Walker
Ann Wylie
Wen-lu Zhu



COLLEGE OF
COMPUTER, MATHEMATICAL,
& NATURAL SCIENCES

Department of Geology
University of Maryland
College Park, MD 20742



GEOLOGY DEPARTMENT • FALL 2014

FRONT ROW, (l-r):

Igor Puchtel, Tracey Centorbi, Sujay Kaushal, Daniel Lathrop, John Merck, Aaron Martin, James Farquhar (in effigy), Sarah Penniston-Dorland, Laurent Montesi, Wenlu Zhu, Richard Walker, Roberta Rudnick with Zella, Philip Piccoli, Philip Candela, Thomas Holtz, Karen Prestegaard, Nicholas Schmerr, Vedran Lekic, Richard Ash, William

McDonough, Michael Evans, Alan Jay Kaufman

SECOND ROW, (l-r):

Chao Gao, Scott Wipperfurth, Joseph Schools, Rebecca Plummer, Scott Burdick, Allison Greaney, Willie Nicklas, Stephanie Johnston, Emily Worsham, Anthony Mautino, Carolyn Plank, Elizabeth Lee, Alexis Martone, Erin Cunningham, Michael Wilks, Richard Gaschnig, Kang

Chen, Tom Doody, Nivea Magalhaes, Hailong Bai, Yadviga Zhelezinskaya, Lucie Sauzeat, Huan Cui, James Dottin, Mark Larson, Shaobing Zhang, Jianguyi Hou, Rose Smith

BACK ROW, (L-R):

Brian Harms, Nicole Shan, Daniel Eldridge, Joanna Patterson, Kevin Miller, Michelle Montero, Alex Lopatka, Hansheng Cao, Dorothy Brown

CONTACT US

Department of Geology
University of Maryland
College Park, MD 20742

301-405-4082 (p)
301-314-9661 (f)
geology@umd.edu

www.geol.umd.edu

GeoGram is an annual publication of the University of Maryland, Department of Geology. We welcome your comments and feedback.

For address changes and personal updates, please visit www.geol.umd.edu/alum-reg

Acknowledgments: We would like to acknowledge Todd Karvoski for his photography which appears throughout this issue; and Michelle Montero for her work on this year's GeoGram.