

LETTER FROM THE CHAIR

“It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us, we were all going direct to heaven, we were all going direct the other way—in short, the period was so far like the present period, that some of its noisiest authorities insisted on its being received, for good or for evil, in the superlative degree of comparison only.”

*Charles Dickens
A Tale of Two Cities*

The best or the worst of times?

In late spring 2007, Provost Bill Destler moved to Rochester Institute of Technology as President, and Nariman Farvardin, who had been Dean of the A. James Clark School of Engineering, became Provost. Farvardin’s task as our new Provost is to lead the university from very good to great within the next decade (for information, currently the University is ranked 37th in the world and 12th among US public universities according to the 2008 Academic Ranking of World Universities <http://www.arwu.org/rank2008/en2008.htm>). To this end, during the 2007-08 academic year he chaired a committee to develop a Strategic Plan that was accepted by the Senate in May 2008.

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“...it [the Strategic Plan] is an opportunity to take charge and create our own future...”

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This is not a typical Strategic Plan packed with fuzzy platitudes, but an

action plan that will make the Campus better and stronger. To accomplish this, money will revert from Campus Units to the Provost’s Office for reinvestment in strategic priorities. This has been a tough sell to the Campus as budget cuts have eroded our State funding and as the State moves into a dramatic financial downturn (for information, the Department’s funding is composed of approximately equal proportions from the State to support education, and from Grants and Contracts to support research). We face reversions and budget cuts for FY 2009, and nothing but gloomy predictions for FY 2010—**doesn’t this seem like the worst of times?**

The Strategic Plan is challenging; it requires that the Campus commit to reinvesting its resources in strategic priorities. The Provost seeks a partnership with alumni and friends and the State to deliver two billion dollars in support over the next decade to implement the Plan fully (see, for example, “Great Expectations – the campaign for Maryland”).

What does this mean for us? Simply put, it is an opportunity to take charge and create our own future within the opportunities provided by the Strategic Plan. This is what we will do. **Surely, this is the best of times? *Carpe diem!***

We will work with the Department of Astronomy to create a Center for Planetary Origins. This will involve strategic links with the NASA Goddard Space Flight Center, the Smithsonian Institution and the US Geological Survey to develop a world-class Center that will attract the best and brightest faculty, researchers and students to our Campus. Our understanding of the

creation and evolution of planetary systems is undergoing rapid change, and the coming decade will revolutionize our view of our origins and the context of our solar system formation and evolution within the Universe.

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“We will work with the Department of Astronomy to create a Center for Planetary Origins.”

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Observational advances in astronomy, developments in analytical instrumentation in cosmochemistry and astrobiology, and theoretical advances in planetary science have placed firmly within our grasp the ability to ask some of the most profound questions imaginable. How did our solar system and the planets within it originate? Are there other solar systems like ours? Is there life elsewhere within our solar system or in another? The Center will deliver transformative research to answer these questions, and faculty in the Center will develop new courses in planetary origins and evolution and offer a new major.

Also, we will work with the Departments of Chemistry &

RESEARCH HIGHLIGHT



NASA funded deep time drill core through the 2.5 Ga Mt. McRae Shale in Western Australia

Geochemists James Farquhar and Jay Kaufman search for isotopic clues to the Precambrian rise of atmospheric oxygen. Results of their studies were published in four papers in *Science* and *Nature* in 2007. (see article on p. 7)

Biochemistry and Physics, and others on Campus and throughout the country, to develop a Center for Nuclear Science & Forensics. This Center will advance interdisciplinary, fundamental research in the rapidly evolving field of nuclear science, particularly with respect to nuclear forensics—the analysis of nuclear materials recovered from either the capture of unused materials or from the radioactive debris following a nuclear explosion—and related areas of nuclear science.

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“...we will [work with other departments on campus] to develop a Center for Nuclear Science & Forensics...”

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Through the Center we will attract and train a new and diverse generation of scientists and engineers in state-of-the-art techniques in chemical and isotopic measurement skills, develop new technologies and improve instrumental methods for precise and accurate analyses of smaller and smaller quantities of nuclear materials appropriate to enable identification of a culpable source, and devise new numerical modeling techniques for constraining the potential source, formation processes, and age of samples studied in nuclear forensics and related fields. The Center will conduct a robust program of public outreach in collaboration with the Smithsonian Natural History museum to educate the public about issues associated with nuclear science, engineering, and forensics.

In addition to developing these Centers, we propose to hire senior faculty to propel our fledgling group of Geophysicists to rank on a par with our world-class group in Geochemistry (which was ranked # 10 by US News and World Report in 2007). We will respond to challenges set by the Campus in redesigning the General Education program for our undergraduate students and in enhancing the experience for our graduate students.



Jeanne Martin receiving the Regents University System Staff Award for Outstanding Service to Students, with UM System Chancellor Wm. E. Kirwan, UM President C.D. Mote, and Board of Regents Chair C. Kendall.

This is also an exciting time for our graduates. According to *Science Magazine* “In the Geosciences: Business is Booming” in spite of the economic situation (*Science Magazine* of 8 August 2008, p. 856-859). Although federal funding is flat, which affects those of us in academia, there are plenty of jobs in the petroleum, mining and environmental consulting industries as shortages of energy, the commodities boom and the ongoing water problem drive demand for more geologists.

I hope you are as excited about our future as we are. Of course, the future rests with our faculty, students and staff. It is, therefore, gratifying to review some of their successes during the past year. Let me begin by welcoming **Mike Evans** to the faculty. Mike is a truly interdisciplinary scientist (see profile on p. 6) who strengthens significantly our links with the Earth System Science Interdisciplinary Center (<http://www.essic.umd.edu/>).

When we hired **Andy Campbell** three years ago we had high expectations of him in developing a research program in mineral physics at Maryland. His impressive start here has been rewarded by the College of Computer, Mathematical and Physical Sciences (CMPS) Board of Visitors who selected Andy as the CMPS Board Distinguished Assistant Professor for 2008—congratulations to Andy! As our

dean likes to emphasize “*it is the reputation of our faculty and the quality of the education we provide that makes a Maryland degree in our disciplines so valuable.*”

Student evaluations of Andy’s undergraduate class in Mineralogy are exceptionally good. This reflects not only on Andy’s teaching, but also his partnership with **Ryan Kerrigan** in the Lab classes. Ryan received the CMPS Dean’s Award for Excellence in teaching by a TA at the spring Academic Festival—congratulations Ryan!

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“...we propose to hire senior faculty to propel our fledgling group of Geophysicists to rank on a par with our world-class group in Geochemistry.”

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We rely on our staff. As many of you may know, **Jeanne Martin** has been with the Department for a long time, twenty-five years in fact, a feat that was recognized in the early spring when she received a watch from the Campus for this milestone. However, more rewarding for Jeanne I believe were the three awards she received for the quality of her work and service. Jeanne received the 2008 CMPS Dean’s Non-Exempt Employee Award at the spring Academic Festival, the 2007-2008 USM Regent’s University System Staff

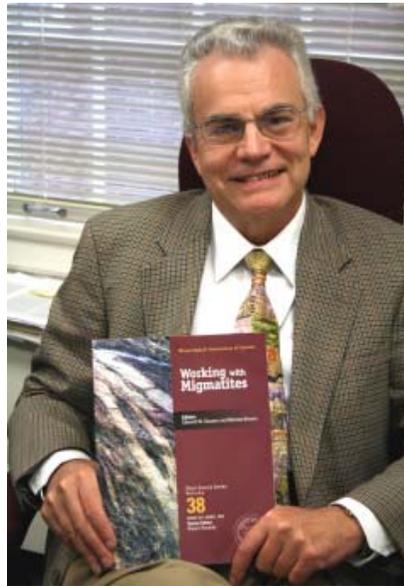
Award in the category of Outstanding Service to Students - Non-Exempt Staff at their first meeting of the fall, and the 2008 President's Distinguished Service Award at the annual Convocation—congratulations to Jeanne!

Although **Rich Walker** receives no award after 14 years as the Director of Graduate Studies, he is very deserving of our sincere thanks for developing our graduate program into one of which we all can be proud. Strictly speaking, our ranking of 10th in Geochemistry is for the graduate program (see the GeoGram for 2006 at <http://www.geol.umd.edu/pages/Department/Geogram/geogram2006.pdf>). As chair, I am very grateful for Rich's strong advocacy for our graduate program at the College and campus levels, and the strength of our program in Geochemistry will be his legacy. I welcome **Bill McDonough** as our new Director of Graduate Studies.

Let me return to strategic planning. As we revert money to the State, the immediate future seems bleak, but now is the time to develop our plans, push our ideas and lay the foundation to strike whenever opportunities are made available to invest in us. The economy is cyclic—it will recover, and we must be ready.

If we are to succeed in these endeavors, not only have we to win arguments on Campus and present compelling cases for investment in us above others, but also we must secure increased support from our alumni and friends in this partnership to build our Department. Many alumni, at one time or another, have received some support from funds within the Department or elsewhere on Campus, and many claim that the funds were critical in allowing them to complete Field Camp, Senior Thesis, or even their degrees. Many of our Geology majors receive Campus and College help via scholarships and fellowships, and help in the form of awards from the department to defray some of the costs of field camp and

research. We must continue to support our undergraduate students to ensure they achieve their goals.



Mike Brown taught a two-day short course with colleague Ed Sawyer (Université de Québec à Chicoutimi) titled "Working with Migmatites" at the joint Geological Association of Canada and Mineralogical Association of Canada annual meeting in May 2008 for about 50 professional geologists and graduate students.

However, to achieve the goal of a great department, we must also find ways to create sponsored professorships and opportunities in research for graduate students that will bring the best and the brightest to Geology at College Park. Please consider contributing to help our undergraduate students with the costs of Field Camp or their Senior Thesis, our graduate students with their research, or the Department through an endowed Professorship. If you are considering a larger gift, please contact me (mbrown@geol.umd.edu). Alumni support can make a critical difference to the future of our department.

Michael Brown

October 2008

HOW CAN YOU HELP US?

This is an exacting time at Maryland. We're recruiting world-class faculty and talented students. We are exploring new frontiers in rapidly emerging fields. Our Faculty are receiving recognition for their achievements. We have one of the best Geochemistry Programs in the world, and we will build one of the best Geophysics Programs as well. And we're all working together to become one of the top Geology Departments in the Nation.

But, we need your help to reach this goal! How can you help us?

In this tight economy, the support of alumni and friends like you is the key to our success and to maintaining our commitment to excellence. Whether you support us yourself or put us in contact with someone who can, your contribution is sincerely appreciated. Your tax-deductible donation will help us strengthen our program with faculty and student recruitment tools, state-of-the-art facilities, an enhanced fieldwork program for our undergraduates and innovative outreach programs.

A growing problem for our undergraduates is the transfer of the cost of tertiary education from the State to the individual via reduced State support and increased tuition rates. The extra cost commonly increases the time it takes to complete the degree, and our ability to help is limited by a significant under-funding in scholarship support for students. In Geology, this is particularly important, since there are the additional costs associated with fieldwork, particularly Field Camp and research for the Senior Thesis, and additional financial help from the Department for those in need commonly allows these students to succeed. Through the generous support of our faculty, alumni and friends we were able to provide financial support to several students to assist with the costs of field camp in 2008. But we must do more.

Please consider strengthening your connection to the Department. I ask you to join with me and the faculty in

(continued on back cover)

DISTINGUISHED ALUMNUS

Joseph P. Smoot 1973

Celebrating the success of our alums reminds us of the varied careers that our graduates follow and of the serendipity involved in their success. This year the Geology Department Distinguished Alumnus is Joseph P. Smoot. Joe received his BS in 1973—essentially a geology degree complete with senior thesis, but in fact the last year of geology within the BS in the agronomy program—and then switched to Johns Hopkins University for his Ph.D., working on the sedimentology of an ancient saline closed basin in Wyoming. After his Ph.D. in 1978, Joe became an Assistant Professor at SUNY Stony Brook before moving to the U.S. Geological Survey in 1983. Currently, he works with the Eastern Climate and Eastern Earth Surface Processes Teams based at Reston, VA.

Joe has combined a background in the fluid mechanics of sediment transport and

aqueous geochemistry with field mapping and fabric analysis of sedimentary rocks to unravel how ancient sedimentary sequences formed. This unique process-oriented approach has freed him from the constraints



Joe Smoot with CMPS Dean Halperin and Geology Chair Mike Brown at the CMPS academic festival

imposed by specific depositional processes, sediment types, environments or intervals of time. Among his accomplishments, Joe devised a sedimentological framework for the Newark Supergroup basins in the eastern US and he recognized a variety of

depositional environments in the geological record that were previously unknown despite a hundred years of research. Joe is an internationally recognized expert in non-marine evaporites, Early Mesozoic rift basins and the sedimentary record of climate change in lakes. It is this last specialty—the sedimentary record of climate change in lakes—that is important. I'm sure Joe did not realize as a student in the 1970s exactly how important sedimentary basins were to become in relation to the record of climate change they preserve! Serendipity or astute planning aside, Joe has worked on the climate record preserved by lacustrine sediments in the western U.S. for a large part of his career, contributing significantly to our understanding of long-term climate change on Earth. As we have come to expect from our alums, Joe is a frequent invited speaker at international conferences and is tireless in running field excursions to pass on his experience.

RECOGNITION AND AWARDS

2008 was a banner year for Department of Geology faculty, staff, and student recognition and awards. Foremost among these is **Jeanne Martin**, who has been an anchor for the department since the inception of the Graduate Program 25 years ago.



Jeanne Martin reminiscing fondly over her cabinet full of graduate student files

In her early years at the university, Jeanne was a general typist for the Chair

Luke Chang and the other faculty. “We actually had typewriters back then,” she said, but when **Mike Brown** and his dictation machine came onboard “my workload increased dramatically.”

Working part-time in order to be available for her family, Jeanne has nonetheless been very active in all aspects of the department, including the Geology Club softball team. She fondly remembers the annual picnics at Ann Wylie’s home, but more than anything else, Jeanne remembers all of the department’s graduate students.

Since 1982, there have been over 100 Ph.D. and M.S. degrees awarded in the department. “All of these students were special to me in one way or another,” Martin said, “I could probably tell you a little something about each of them (especially those who played softball with the Department in the late 80s and early 90s!)”

For example, when she was first learning how to use a computer in 1987 Jeanne was helped by “a good-looking,

curly-haired Ph.D. student who seemed to know a lot about computers. No matter how many questions I had, he would generously give of his time, and he still does.” **Phil Piccoli** is an important part of the Department, College and University.

“Another student I remember fondly is **Gary Solar**, one of **Mike Brown**’s students” who is now an Associate Professor and Chair at the State University of New York, Buffalo. As she was transcribing many of Dr. Brown’s tapes, Gary and Jeanne worked closely together and became good friends. “We still stay in contact,” she said.

The number of past students that keep in touch with Jeanne can be monitored by the various family pictures that get pasted in the hallway outside of her office on a regular basis. Among these ‘pets’ are **Doug Bell**, **Liz Brabson**, **Steve Bouton**, **Jerry Burgess**, **Katie Cooney**, **Amina DeHarde**, **Mark Frank** (Assistant Professor at Northern Illinois

University), **Dave Johnston** (soon to be Assistant Professor at Harvard University), **Ruth Schulte**, **Adam Simon** (Assistant Professor at UNLV), **Paul Tomascak** (Associate Professor at State University of New York, Oswego), and **Mike Wietrzykowski** (who stopped in when he was here to receive the CMPS Distinguished Alumnus Award in 2003).

Jeanne has a special rapport with the department's graduate students, which really comes through at graduation. "They are always so nervous," she said, "and I try to give them 100% of my support."

We congratulate Jeanne on her well deserved awards this year, and thank her sincerely for the extra mile she has walked for the Department of Geology over the years.

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Andy Campbell with his 2008 CMPS Board of Visitors Distinguished Professor award

In just a very few years since moving from the University of Chicago Assistant Professor **Andrew Campbell** has established a state-of-the-art Laboratory for Mineral Physics, and redefined the teaching of mineralogy in the Department of Geology.

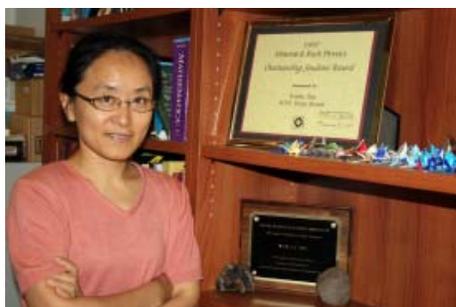
In the laboratory Andy uses diamond anvil cells to generate high pressure conditions comparable to those in the Earth's mantle and core. The diamond

anvils not only apply the pressure, but act as windows to the sample, allowing optical and X-ray access. The sample's physical and chemical properties can be probed using a variety of laser spectroscopies and X-ray techniques.

For his innovations in the lab and his excellent teaching reviews Andy was selected by the CMPS Board of Visitors to receive the Board's Distinguished Assistant Professor Award this year.

For further information see <http://www.geol.umd.edu/pages/faculty/CAMPBELL/campbell.html>

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Wenlu Zhu with her 2007 Best Research award from the American Rock Mechanics Association

Assistant Professor **Wenlu Zhu** likes to break rocks. In the University of Maryland Laboratory for Rock Physics, she conducts deformation tests to investigate how brittle faulting and ductile flow affect transport properties, such as permeability and porosity. These studies are currently applied to a wide range of sedimentary and igneous rocks, as well as mid ocean ridge hydrothermal vent chimneys.

Her paper with colleague Joe Walsh titled "A new model for analyzing the effect of fractures on triaxial deformation" received the Best Research Award by the American Rock Mechanics Association. The award was given during a ceremony at the 42nd meeting of the association in San Francisco in June 2008.

For further information see <http://www.geol.umd.edu/pages/faculty/ZHU/zhu.htm>



Roberta Rudnick with her fellowship from the Geochemical Society and European Association of Geochemistry

The walls of **Roberta Rudnick's** office are getting a bit crowded with all the fellowships and awards she has received over the past several years. In addition to her becoming a Fellow of the Geochemical Society and European Association of Geochemistry this year, she was made a Fellow of the American Geophysical Union in 2005 and won the Bowen Award from AGU in 2006.

Roberta's primary research focuses on the origin and evolution of the continents, particularly the lower continental crust and the underlying mantle lithosphere. Recently, however, Roberta has been exploring the utility of lithium isotopes in tracing crustal recycling in the mantle as well as surface weathering processes.

For further information see <http://www.geol.umd.edu/pages/faculty/RUDNICK/rudnick.html>

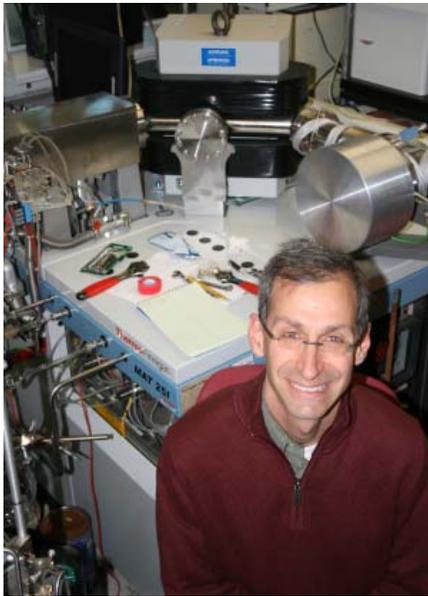
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Ryan Kerrigan with his 2008 CMPS Dean's Award for Excellence in teaching by a TA

MEET THE NEW FACULTY

Michael Evans



FROM TREES TO SEAS

Michael Evans likes to hug trees - at least those growing in the tropics and affected by changing rainfall patterns associated with El Nino - a globally coupled phenomenon of the oceans and atmosphere.

“Tree rings are for sissies,” he said, as the tropical trees Mike studies grow equally all year long and have no rings. Thus to chart annual variations in rainfall, Mike had to develop a novel and rapid technique for measuring oxygen isotopes in woody cellulose, which gives him a sense of variable rainfall.

He is excited to bring this technology with him from the University of Arizona Laboratory for Tree Ring Research to Maryland, where he has just joined the Department of Geology and ESSIC - the Earth System Sciences Interdisciplinary Center as an Associate Professor.

Mike graduated from Harvard College with a Special Concentration in Environmental Science and Policy, and received his Ph.D. in Earth and

Environmental Sciences at Lamont-Doherty Earth Observatory of Columbia University. He was an NCAR Climate and Global Change postdoctoral fellow at Harvard before starting a tenure track position at the Laboratory of Tree-Ring Research in 2001. At Arizona he earned tenure and also held courtesy appointments in Geosciences and Atmospheric Sciences. He was a member of Graduate Interdisciplinary Programs in Global Change and Statistics as well as the Institute for the Study of Planet Earth. While at Arizona, Evans was also successful in gaining a prestigious Career grant from the National Science Foundation for his research.

Mike is a multiproxy paleoclimatologist with expertise in stable isotope techniques, objective analysis of spatiotemporal data, and high-resolution paleoclimate field reconstruction. He is especially interested in the long-term variations of tropical phenomena such as El Nino, and the hydrometeorological aspects of climate change.

His current research projects include the development proxy estimates of precipitation from the isotopic characterization of tropical woods; modeling of paleoproxy data such as coral and tree-ring isotopic compositions and growth bands; and the use of these data as the basis for reconstructions of sea surface



Workers coring through a tropical tree in Panama

temperature fields using ensemble optimal interpolation and Bayesian hierarchical techniques.

Mike looks forward to leading graduate courses on related topics, and to help bridge the Geology undergraduate program with that developing in Atmospheric and Oceanic Sciences (AOSC).

“Maryland is a phenomenal place to work in the climate sciences,” he said, — beyond Geology, ESSIC and AOSC, there is the Program in Applied Math and Scientific Computing, and the NOAA Cooperative Institute in Climate Studies, NASA/Goddard Space Flight Center, and the National Centers for Environmental Prediction are all close by.



Mike is father of two girls, Aditi and Maya, and is married to Anu Gupta, a former tectonophysicist who is launching a new career in life coaching. After spending almost 8 years in the desert Southwest, he is happy to be back on the East Coast near extended family, the ocean, big shady trees, abundant fresh water, public transportation, and the cultural and culinary attractions of the DC area.

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For additional information on Mike Evans, his laboratory, and research go to <http://iceman2.umd.edu/www/>

THE HISTORY OF O

Life as we know it depends on the presence of oxygen in Earth's atmosphere. Today there is 21%, but scientists believe that in the early history of the planet there was virtually none. The breathing gas largely accumulated by microbes that captured light energy from the sun and harnessed it to both fix carbon dioxide into sugar and split water thus releasing oxygen to the air.

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Farquhar and Kaufman's research reveals discrete pulses of oxygen at the beginning and end of the Proterozoic Eon.

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While these basics are known and widely accepted, charting the history of oxygen in the atmosphere has until recently been mere guesswork. But, by collecting thousands of samples of well-preserved ancient sediments in cores (see cover) from around the world and by using their sophisticated instrumentation at UM, geochemists



James Farquhar and **Jay Kaufman's** research reveals discrete pulses of oxygen at the beginning and end of the Proterozoic Eon – that is around 2,350 and 550 million years ago.

According to **Kaufman** and **Farquhar**, at these times oxygenation of the atmosphere had a profound impact on the land, on the oceans, and on life. Their research suggests that variations in the abundance of the breathing gas in the early Proterozoic atmosphere may also be related to extreme climate change – insofar as the timing of oxygen rise immediately preceded a series of world-wide ice

ages. In the late Proterozoic, they suggest that the rise of oxygen may now be directly linked to the evolution and diversification of higher plants and animals. Reports of these spectacular findings have recently been published in high profile magazines including *Science*, *Nature*, and *Proceedings of the National Academy of Sciences*.

Combining their expertise in carbon and sulfur isotope geochemistry, these world-renowned UM scientists attract an international following. Each year their joint laboratory facility



hosts several guests from across the nation and around the world. In support of the Geology Department focus on outreach and undergraduate education (including the capstone Senior Thesis Program), **Farquhar** and **Kaufman** train and advise local high school interns – including those from Charles Herbert Flowers, Eleanor Roosevelt, James Madison, and Montgomery Blair high schools – and undergraduates in the geochemical techniques necessary for their evolutionary studies. Since its inception just over a decade ago some 40 undergraduate and high school students have worked in the stable isotope facility alongside **Kaufman** and **Farquhar** and their graduate students.

One of the high school interns, **Aarisha Shrestha** – now a UM undergraduate – was awarded the grand prize for her Science Fair project titled “Environmental Setting for Earth's Earliest Eukaryotes” at the annual Prince

Georges Area Science Fair in 2006. Aarisha was then invited to present her research at the Intel International Science Fair that year in Indianapolis. In that same year, CMPS valedictorian **Andrew Masterson** finished his laboratory-based senior thesis in the stable isotope facility where he later worked as a Faculty

Research Assistant before moving on to UCSD for graduate school. Andy is a co-author of several of the high profile publications on the evolution of Earth's

breathable atmosphere. Finally, in 2007, undergraduate **David Weinstein** (also a Faculty Research Assistant until he left on a full fellowship for graduate school at USF won the J.R. Dorfman prize for the top Senior Thesis in the College of Math and Physical Sciences.

Although the success of their recent publications on the history of atmospheric oxygen might allow these researchers to breathe deeply, **Farquhar** and **Kaufman** are looking forward to expanding the capabilities of their stable isotope facility and the scope of their joint research.

Last year **Kaufman** was on sabbatical in Germany funded by a prestigious DFG funded Mercator Guest Professorship. This year Farquhar is a Visiting Professor at the University of Southern Denmark while on his sabbatical leave.

For additional information on Kaufman and Farquhar please see <http://www.geol.umd.edu/pages/faculty/KAUFMAN/kaufman.html> or <http://www.geol.umd.edu/pages/faculty/FARQUHAR/farquhar.html>

DEPARTMENT HIGHLIGHTS

FACULTY HIGHLIGHT

Antonio Segovia

**Retired Associate Professor of
Geology**

This year's Faculty Highlight is retired Associate Professor **Antonio Segovia**. Tony came to the University of Maryland in 1969 when he was hired by **John Foss**, then head of Soil Science, to teach geology for the Agronomy Department along with **Leonard Fernow**, **Galt Siegrist**, and **Peter Stifel**. Segovia taught courses in Physical, Environmental and Engineering Geology; Geological Remote Sensing; Ground Water; and Structural Geology over his 30 years of service to the university.

Segovia was born and raised on the pampas of Paraguay, but has traveled widely in his lifetime. While majoring in Cartography he got an undergraduate degree in land surveying (topografo) in 1954 at the National University in Asunción. Tony then fled the country in response to the 1954 coup d'état of the military dictator Alfredo Stroessner, and moved to Boulder, Colorado where he got a degree as a Geological Engineer from the Colorado School of Mines in 1956.



Antonio Segovia lighting a rock he studied from Paraguay composed of fossilized amber resin mixed with clay



Tony subsequently returned to South America to search for oil in Boliva, and to care for his ailing father in Paraguay. That return, however, was fraught with difficulties as Segovia's family members were outspoken critics of the government. Stroessner (a German emigrant) provided safe haven for Nazi war criminals, crushed peaceful opposition, and persecuted indigenous populations in Paraguay.

When the Gulf Oil Company started up a photogeologic unit in New York, Segovia was called back to the United States. His first jobs included flying around in helicopters pointing out geomorphic features of the landscape and mapping fracture traces on aerial photographs. Gulf Oil helped Segovia attend the Pennsylvania State University where he received a Ph.D. in 1963 working on the geomorphic expression of fractures in the eastern Andes of Columbia. The resulting map and geological interpretation - largely done on muleback - was published in the Bulletin of the Geological Society of America.

After the Ph.D. Segovia moved to Oriente University in Venezuela where he taught several courses in subsurface and structural geology. He later moved to Oklahoma to work for the Sinclair Research Corporation in Tulsa, again searching for oil by looking at aerial photographs of surface features.

His next move brought him to the attic of H.J. Patterson Hall at UM where he

was bitten by a bat and had to undergo a series of painful rabies shots. Segovia's primary research interest at UM was in how silica flowed through fractures in the ground. He was also known for his study of plant phytoliths found in paleo-Indian sites throughout the mid Atlantic States.

Phytoliths, or plant stones, are rigid microscopic bodies often composed of silica that occur in many plants. Segovia isolated these in his gulag laboratory over in the Chemistry Building to identify the food that the paleo-Indians ate.

Over the years Segovia literally taught thousands of students, often covering multiple sections of Physical and Environmental Geology in a semester. He was also an advisor to countless undergraduate Senior Theses, and co-advised graduate students at other universities in this country and abroad.

Tony sent his two daughters to UM where they got degrees in journalism and criminology. He still lives in College Park with his wife and hyperactive chihuahua. Segovia continues to work with phytoliths and paleo-Indian communities and has a new interest in the introduction of pre-Columbian plants to indigenous regions of Paraguay. Segovia is also currently active with the Catholic University chapter of Engineers without Borders - a group that is involved in engineering-related international development with a common mission of serving the needs of disadvantaged communities throughout the world. With this group Tony is working on a project to provide clean water to peasant villages in Paraguay where the population is increasing, but the shallow aquifers are polluted.

GRADUATE STUDENT HIGHLIGHT

Gwendolyn Rhodes

Looking to the skies and feeling the rain beat upon her eight-year-old face, our most recent Ph.D. graduate and this year's Graduate Student Highlight **Gwendolyn Rhodes** fell in love with water, and somehow knew that someday she was going to be a hydrologist. What she couldn't predict was the particularly long and sinuous route she would take to get there.

After graduation from Chamberlain High School, Gwen – a Washington D.C. native – attended George Washington University in the early 1970's. At the same time she worked at the US Bureau of Labor Statistics where she was introduced to statistics and helped with the development of one of the earliest computer graphics programs. Later, Gwen took courses in engineering and construction management at the University of the District of Columbia. When she suddenly had to pick up stakes and move to Atlanta to help her ailing father, it seems apropos that she would then work for CSX railroad. Gwen later worked for Fulton County as a building and zoning inspector; her experiences in erosion and sedimentation control from her days working on the railroad apparently came in handy.

By 1993 Gwen was back in school at Georgia State University where she majored in geology rather than engineering. She knew that she wanted to study rivers, but decided that she would rather “try to understand them rather than control them” – a central philosophy of her life as well.

For her Master's degree, Gwen moved to Central Washington University to work on the causes and consequences of paleo-floods in the Snake River of central Idaho and Oregon. Working with a regional

distribution of 60 flood gauges, historical records of weather, rainfall, and atmospheric pressure, and carbon-14 dates generated from her carbon samples, Gwen now recognizes that the major floods in this river system are directly tied to the Pacific Decadal Oscillation (or PDO), a pattern of



climate variability that occurs every 20-30 years. During a cool PDO phase the west Pacific near the Aleutian Islands becomes warm and the Pacific Ocean off the coast of California becomes cool.

For her Ph.D., Gwen chose to return home to Washington D.C. in 2000, and looking around for an interdisciplinary program landed in the Department of Geology with Assoc. Prof. **Karen Prestegaard**. At first Gwen thought she might apply optical luminescence – a method of determining how long ago certain minerals were last exposed to daylight – to provide age constraints on paleofloods in the Potomac Basin. This study, however, was cut short due to an outbreak of Mad Cow disease in Wales where she had planned to learn the technique with an international expert in the field.

Instead Gwen took historical watershed and rainfall data and measures of soil moisture levels before and after storms to evaluate the causes of extreme floods in the Potomac Basin, especially related to multiple storms that hit the region during the 2005 hurricane season. In this study she also found a statistical connection of the Pacific Decadal Oscillation to hurricane-induced paleo-floods on the eastern seaboard of the United States.

The Ph.D. at Maryland was a “long, grueling, and scary, but also enlightening” experience for me, said Dr. Rhodes. “**Mike Brown** was very

good to me,” she said, “he called me up to offer a two year Graduate School fellowship” and with **Karen Prestegaard** he later supported my application for a GANN (graduate fellowship in areas of national need). The GANN proposal was successful and supported Gwen's research activities for three years.

Throughout the years Gwen's family floated down her long river to success. “Where I go, they go,” Gwen – the matriarch of a clan – said. They supported my field studies, stood firm during personal tragedies, and provided strength so that she had the stamina after decades of effort to reach this lofty goal. In life, Gwen said, “everything is a lesson, especially in how to love others and yourself.”

Reflecting on those years, Gwen concluded that the long perspective provided by geologic time shows me how connected we all are.

UNDERGRADUATE STUDENT HIGHLIGHTS

Garrett Mitchell

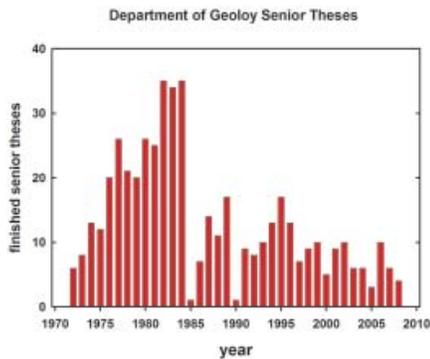


This year's Undergraduate Student Highlight, **Garrett Mitchell**, is probably more at home in the ocean than on dry land. He has been a research diver and aquarist for close to a decade, working on different reefs and aquariums around the world. Joking about the aquarium jobs he said, “I've cleaned algae off of almost everything imaginable.”

(story continued on next page)

SENIOR THESIS PROGRAM

The Department of Geology senior thesis program, coordinated by **Phil Candela** for the last 12 years, has been a fixture of the Department of Geology since 1972. The numbers of completed theses each year has changed dramatically according to current figures. For example, there were 35 theses each year from 1982 to 1984 after which there was a precipitous drop off likely associated with sharp cutbacks in oil industry jobs.



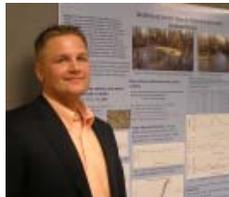
Senior thesis poster presentations have enhanced the program since 2003; these represent one of the four presentations associated with the long established program, which is used as a model of success across campus. We wish each of our departing students, and newest alumni, the best of luck with their future endeavors.



Via, Marco. *Topography of the Thermal Boundary Layer at the Base of the Mantle* (Heir-Majumder)



Bilenker, Laura. *A Phase Equilibrium Study of Cu-Fe Sulfides Between 700°C and 800°C* (Candela/Piccoli/GS Tattich)



Kosiba, Andrew. *Stability of Gravel Bars & Bedload Transport in Paint Branch Creek* (Prestegaard/GS Blanchet)

To see the posters from this year's presentations and lists of theses over the past 35 years go to <http://www.geol.umd.edu/pages/undergraduates/SeniorThesis.htm>.



Skold, Peter. *Investigation of Kyser Limestone Paleoenvironments at the Cumberland Bone Cave* (Holtz)



Leone Gold, Eugenia. *Correlating the "Fulton Site" within the Gettysburg Basin* (Holtz/Merck/Fulton/Weems)



Raum, Joseph. *Measuring U-Pb Zircon Ages in the Bear Island Granodiorite* (Martin)

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Garrett started his academic career as biology major at Clemson University, but once he got a taste of the beach life, he moved to San Diego where he became a "surf dude" working as a dive master and SCUBA instructor. During those years Garrett learned not to surf after it rains (once getting pollution sickness), what it is like to be attacked by a Great White Shark (while in a submerged cage), and how to dye corals green (in a study of fluorescent corals on Australia's Great Barrier Reef in collaboration with Yale University researchers).

After sleeping with sand in his ears for four years, however, he decided that he needed to get serious about a career. "I didn't want to turn 40 on the beach," he said. This decision led him back to his family in Maryland, and to UMD where he is about to complete a double major in Geology and Geography, both degrees with honors.

Associated with his degree in Geography, Garrett did a NOAA sponsored shipboard hydrographic survey in 2006 to update nautical charts and determine the current distribution of corals reefs offshore of Solomon's Island, North Carolina. In 2007 he

continued to work with NOAA in a second shipboard mapping effort of deep coral reef habitats near Puerto Rico.

Like so many other undergraduates, Garrett was hooked into Geology after taking a course with Senior Lecturer **John Merck**, and has been an undergraduate star in the department ever since. Mr. Mitchell, who maintains a Dean's list GPA, has been honored for his efforts with a remarkable number of awards and grants for his research and academic excellence.

OUTREACH ACTIVITIES

The Gems and Minerals Museum

The Gems and Minerals Museum has been open for 25 years. The initial donor of specimens was someone with few connections to the University, and fewer connections to the department – **Mr. Irvin E. Freedman**. Those specimens had been collected over the span of several decades. In 1930, Mr. Freedman visited the Colorado School of Mines and had the opportunity to observe the specimens in their collection. His interest in gems and minerals started shortly after that visit and continued until his generous loan of specimens in 1983.

Freedman was a successful supermarket designer and outfitter, and that allowed him the means to become an avid gem collector. He collected many of the specimens himself, travelling on numerous occasions to mines in Columbia and Brazil. The museum is often recognized by the 200 pound quartz crystal with necklace of tourmaline.



Freedman's favorite pieces in the collection were an 85 carat emerald from Columbia, a synthetic 60 carat ruby, and a clear 5,160 carat topaz.

Shortly after the museum opened, Johannes Martinus Burgers donated a large number of specimens to the museum. Unlike Freedman, Burgers had extensive ties to the University. Burgers was a Dutch physicist, with an appointment in the Department of Mathematics. He was a successful scientist, and is credited with deriving

the Burgers' equation and the Burgers vector in dislocation. His success and contributions to the discipline led to the formation of The Burgers Program for Fluid Dynamics at the University.

The museum is open on Maryland Day, and by appointment (301-405-4365).

Maryland Day

Mark your calendar on April 25, 2009 for Maryland Day this spring, and plan on visiting the Department of Geology. Each year the Gems and Minerals Museum is open to the public on Maryland Day, and we provide tours of our state-of-the-art laboratory facilities in both the Geology and Chemistry buildings.



In the past **Bill McDonough** has made water quality measurements in the Plasma Laboratory, and **Phil Candela** has melted rocks at high pressure and high temperature experiments in the Laboratory for Mineral Deposits Research. Over the years we have also offered various activities for children, including a sandbox dig for shark teeth, dinosaur art, and a create-your-own pet rock.

The MD state fossil, a predatory sea snail named Ecphora, can be seen in the Museum



Prince George's Area Science Fair



Roberta Rudnick presenting Brandon Sanders with a certificate and a check

For the past few years the Department of Geology has sent representatives to the Prince George's Area Science Fair - the oldest science fair in the country - to judge posters related to the Earth sciences.

Our science fair award for 2008 went to Brandon Sanders, a senior at Eleanor Roosevelt High School for his poster titled "Error of Satellite Data vs. Ground Truth." Brandon used LANDSAT data at 12 sites and made comparisons of satellite tree cover estimates with the direct measurements he made on the ground.

* * *

Alumni Always Welcome

Whether on Maryland Day, at Senior Thesis presentations, or any other time, alumni are welcome back to the department. We are proud of our accomplishments and our laboratories, and want to show you how we have grown. We look forward to seeing you in the near future.



B.S. (1994) and M.S. (1998) student Sarah Libeau (Ph.D. 1998) recruiting for ENVIRON with Rich Walker in the Plasma Laboratory

2008 Department of Geology, University of Maryland



Front row, left to right: Gwendolyn Rhodes, Igor Puchtel, Sang-Tae Kim, James Day, Andy Campbell, Aaron Martin, Sarah Penniston-Dorland, Roberta Rudnick, Zella, Wenlu Zhu, Jay Kaufman, Karen Prestegaard, Mike Brown, Phil Candela, James Farquhar (in photo), Bill McDonough, Laurent Montessi, Phil Piccoli, Sash Heir-Majumder, Dan Lathrop, Rich Walker, Tom Holtz, John Merck

Second row along stairs, left to right: Richard Ash, Tom Ireland, Jingao Liu, Lin Qiu, Daniel Hawkins, Brian Tattich, Tom Tamarkin, Michael Mengeson, Adam Mansur, Milene Figueiredo, Kristin Miller, Zhaobing Guo, Rachel Potter, Noah Miller, Rick Arevalo, Brian Mumaw, Kate Scheiderich, Eugenia Gold, Madeline Blondes, Xiaoming Liu, Kate Burgy, Sinead Eley, Yan Chen, Katya Klochko, Lisa Schleicher, Zachary Blanchet, Barry Reno (in photo), Jeremy Bellucci, Fauna Korhonen, Erik Hankin, Lynette Pitcher, Ryan Kerrigan, Todd Karwoski, Laura Hebert, Craig Hebert

Back row, left to right: Sandy Romeo, Waafaa VonBlon, Keiko Yokoyama, Tetsuya Yokoyama, Dorothy Brown

Not shown: (Resident Faculty) Mike Evans, Ann Wylie; (Post Doctoral Research Associates) Alexy Kamyshny, Satoshi Saito, Zoltan Zajacz, Aubrey Zerkle; (Graduate Students) Heather Franz, Harry Oduro, Gregory Shofner, Nanping Wu; (Staff) Jeanne Martin, Suzanne Martin, Joanna Patterson, Arlene Tolentino

(continued from page 3)

supporting our students reach their goals. I invite you to join the College of Computer, Mathematical and Physical Sciences as members of the Dean's Circle (gift level >\$2,000) or the Newton Society (gift level >\$1,000). An envelope is enclosed, giving you a convenient opportunity to participate, right now, in the exciting and important work that our students and faculty are doing.

You can assist us to support future generations of Geology majors by earmarking your tax-deductible gift for Geology.

Your generous help allows us to provide grants to undergraduate students from

the Fernow Field Fund to assist with the costs of Field Camp, and to award prizes for the Best Senior Thesis from the Stifel Undergraduate Research Fund and for the Best Graduate Student Presentations from the Chang Graduate Research Fund. The Hutton General Fund is used to address other needs in our drive for excellence in Education. In the future we aim to offer funded Summer Internships to support research by undergraduate students.

Gifts to the Department of Geology also may be made directly to the Department by check or online (https://advdev.usmd.edu/Admin/OnlineGiving/umcp_online_giving_first.cfm) using a credit card. Contributions to the Department of Geology by check should be made out to the University of Maryland

College Park Foundation with "Geology" in the memo. To ensure that Geology is the receiver of your gift to the University of Maryland, please be careful when completing the Online Gift Form. In response to the drop down menu "Select School," please specify the College of Computer, Mathematical and Physical Sciences; and, in response to the drop down menu "Select Fund," please specify Department of Geology. If you do not specify these items correctly, Geology will not receive your gift.

I want to thank those of you who have responded in previous years, and on behalf of the Department, offer my thanks, in advance, for your early and positive response to this request for your help this year.