THE UNIVERSITY OF MARYLAND GEOLOGY DEPARTMENT'S ANNUAL

GEOGRAM

LETTER FROM THE CHAIR

We are in the middle of the Fall semester, searches for new faculty are underway across the campus and we are in the throes of the budget building process. Plus ça change, plus c'est la même chose!

It is a year since we celebrated 25 years as a department, but 1998-99 was another year of change. Dr. Antonio (Tony) V. Segovia retired in June, and we wish him well in his future consultancy enterprises. Dr. Christina Gallup will get married next summer and with her partner move to a tenure-track position at the University of Minnesota, Duluth. We wish her well. We welcome Dr. Dazhi Jiang, who will teach Structural Geology and Tectonics, as a new faculty member from August. Currently, we are in the process of hiring a Professor of Geochemistry to replace Christina.

I am sure you are familiar with the sabbatical system that enables faculty to spend potentially every seventh year away from the Campus in some appropriate activity. During the past few years, Dr. Phil Candela spent part of his sabbatical year in Australia and Dr. Rich Walker spent time in Germany. During the coming year, Dr. Eileen McLellan will work as an American Geological Institute Congressional Science Fellow before returning to the Department full-time, having spent the past few years working as a Director in the College Park Scholars Program. Dr. Tom Holtz, a Lecturer in the Department who was also Undergraduate Studies Director, has taken over as a Director in the College Park Scholars Program from July 1. He is replaced as Undergraduate Studies Director by Dr. Bill Minarik, who joined the Department as an Assistant Research Scientist in January of this year. Alternatively, faculty may spend time working for the Government under the Interagency Personnel Agreement, and Dr. Bob Ridky used this mechanism to spend two years as a Program Director at the National Science Foundation. Also, there are opportunities to work for a period in a senior administrative position on Campus, and Dr. Ann Wylie is in her second year as an Associate Dean with responsibility for the Undergraduate Programs in the College of Computer, Mathematical and Physical Sciences.

The summer was a period of flux in the Graduate Program, with several students completing Ph.Ds and a larger number finishing Masters degrees. Our Graduate Program serves two functions, first to provide a higher level of professional training through the Master of Science Program, and second to provide the foundation for a potential academic career through the Doctoral Program. Making the jump from a graduate program to a faculty position is a huge step, and commonly requires several years of post-doctoral research in order to succeed. It is particularly gratifying to report that one of our Assistant Research Scientists, Dr. Al Brandon, who was recently promoted after completing several post-doctoral positions, will be taking a tenure-track Assistant Professorship at Northwestern University from January 2000. Another person moving onward and upward is our Laboratory Manager, Dr. Sonia Esperanca, who has recently taken a position with the National Science Foundation as Program Director in Petrology and Geochemistry. She is replaced by Dr. Paul Tomascak, one of our graduate student alumni, who has spent the past four years in post-doctoral positions at the Department of Terrestrial Magnetism in the Carnegie Institution of Washington and at the Lamont-Doherty Earth Observatory of Columbia University.

From July 1, the University has established an Earth System Science Interdisciplinary Center, which is supported in the first instance by the Departments of Geography, Geology and Meteorology, with yours truly as Interim Director until Summer 2000. The Center is sponsored jointly by the University of Maryland and NASA's Goddard Space Flight Center to enhance multi-disciplinary research in

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THE GEOLOGY BUILDING

Then:

and Now:

INSIDE

Letter from the Chair
...continued

Earth System Science, directed particularly toward improved understanding of global change, and to be the focal point for undergraduate and graduate training in Earth System Science. The Center provides an opportunity to hire an additional Professor jointly between the Department and the Center, which will not only enhance the Department's links with Goddard, but will start us down the road of developing a specialty in Geophysics.

During the 1998-99 academic year, the installation of our replacement electron probe microanalyser was completed thanks to the efforts of Dr. Philip M. Piccoli, and during the current academic year Dr. A. Jay Kaufman is awaiting delivery of two gas flow mass spectrometers. Additionally, we have received funding from the National Science Foundation and the University to purchase a multicollector magnetic sector inductively-coupled plasma-source mass spectrometer. Indeed, whichever way I turn the Department is in a state of flux, and we have recently been given additional space in the Computer and Space Sciences Building to support our expanding activities. Eileen McLellan, Dazhi Jiang and I, along with our respective graduate students, will move to the Computer and Space Sciences Building, enabling the expansion of our geochemistry facilities and the development of a dedicated laboratory for Geology majors doing their senior thesis work.

I have chosen to highlight some of the recent changes and developments as a way to illustrate the vitality of the Department. New blood brings new energy and new ideas, and change brings new opportunities. I am pleased to have shared with you a few highlights of our past year or so, and I encourage you to visit the Department when you are in the area. ⌘

Michael Brown

The 25th Anniversary Celebration

President Mote and Mrs. Mote (just left of center) join us for the reception.

Last September, the Department of Geology held a celebration of 25 years worth of accomplishments since its inception. The people who made those 25 years so worthwhile, the students, now Alumni, were invited to participate in a weekend full of events, including a fieldtrip, presentations of research and tours of the museum and facilities, a formal reception and banquet, and a picnic at Hope Farm. All of the events were a big success and we are very grateful to all of the alumni who were able to attend and to those who were not able to attend, but who updated us on their own accomplishments (see page 10, this issue). Photos of the festivities can be found on the Department web-site (http://www.geol.umd.edu/). Here are the highlights:

– The Great Falls Field Trip: Drs. E-an Zen and Philip Candela led ~30 alumni and friends of the Department on a tour of Great Falls on Saturday morning, Sept. 18th. Dr. Zen started off by giving an overview of the current river channel and describing how it has been affected by the dam and by floods. He followed this up with a description of pothole formation and of what these potholes have to tell us about paleohydrology. Dr. Candela pointed out the local rock types and discussed their origin. Hard to imagine that some of these rocks owe their presence to a long-gone Precambrian ocean and others to the closing of that ocean. There are even some gold-bearing quartz veins in the area! The field trip finished at a scenic overlook of the gorge with a discussion led by Dr. Zen on the possible processes of gorge formation.

– Ten-Minute Madness! After the field trip, everyone gathered back in the Department to see the Geology faculty each try to fit a

25th Anniversary Banquet at Rossborough Inn.

description of their research activities into just 10 minutes. It was a valiant effort!

– Tours of the Museum and Research Facilities: Groups were led by current undergraduate and graduate students to the Mr. and Mrs. Irvin Freedman Gem and Mineral Museum and to the research facilities, including the laboratories for Mineral Deposits Research, Crustal Petrology, Isotope Geochemistry, Hydrologic Studies, Optical Mineralogy, Experimental Mineralogy, X-ray Diffraction, Computing, and the Center for Microanalysis. The chemistry lab in the Isotope Geochemistry lab was still under construction at the time - it is now complete, including new polypropylene cabinetry and hepa filtered air, making it a state-of-the-art clean lab.

– Formal Reception and Banquet: That evening, the Geology Department hosted a reception at the historic Rossborough Inn. It was a lovely evening, so we were able to have the event outside in the courtyard. University of Maryland President Mote and his wife were there to meet the alumni and our special guests, the family of Mr. and Mrs. Irvin Freeman. The banquet followed, which was highlighted by speeches from Peter Stifel, Ann Wylie, and Mike Brown, Dept. Chair. We were very pleased to have almost 100 in attendance! Several alumni were presented with awards, based on votes from their fellow alumni (see inset). The evening wrapped up with a slide show from glorious (and not so glorious!) years past. There was one consistent theme throughout the show - most of the alumni and faculty have a lot less hair than they used to!

– Picnic at Hope Farm: Peter Stifel hosted a pig-roast on Sunday at his family farm on the Eastern Shore in the old tradition, complete with a musical band. Many alumni and members of the Department made the trip and it was well worth it. There were so many things to enjoy on a beautiful day - the swimming pool, the dock on Chesapeake Bay, the goat (!) and the other animals, the delicious food, the band, the hay rides, and of course, the great company. We owe Peter many thanks for putting on such a great finish to a wonderful celebratory weekend! ⌘

E-an Zen enlightens the group about Mather Gorge at Great Falls.

The newly renovated clean chemistry lab.

Alumni Awards

Most Accomplished:
Edwin Jacobsen
Mike Wietrzychowski

Most Studious:
Dan Tarkington

Most Effective Procrastinator:
Rick McDermott

Most Likely to Help Fellow Student:
Carla Evans

Biggest Rock Hound:
Thecla Meyer

Biggest Fossil Hound:
Peter Swietzer

Most Likely to Take Their Children on Geologic Vacations:
Beth and Tony Creamer

SPOTLIGHT ON THE FACULTY

Magmatic-Hydrothermal Science: Research and Education in the Geology Department's Laboratory for Mineral Deposits Research

by Philip A. Candela
Professor of Geology

Our magmatic-hydrothermal geology research group is involved in field, experimental and theoretical investigations of magmatic and hydrothermal processes, including processes that operate in geothermal systems, and in the formation of high-temperature ore deposits. Along with Dr. Philip Piccoli, I direct research by high school, undergraduate, masters, and doctoral students in the Geology Department's Laboratory for Mineral Deposits Research (LMDR). Professor Ann Wylie and her students also conduct research in the LMDR, and their work may be the topic of a future Alumni Newsletter research report.

Philip Candela (left) with Philip Piccoli

The magmatic and hydrothermal processes we study include the crystallization and devolatilization of molten rock in shallow (~1 to 10 kilometer deep) subterranean magma chambers within the Earth's crust. Volatile phases (comprising vapors ± brines) may exsolve from magma during its rise, emplacement, cooling and crystallization. These volatiles can then flow into overlying, rain-water dominated, fracture-hosted, hot-water hydrological systems. There, the magmatic volatiles mix with colder waters and/or react with the surrounding rock, depositing ore at temperatures of 250^{o}C to greater than 600^{o}C. These ores can include economic concentrations of , for example, chalcopyrite ($CuFeS_2$) bornite (Cu_5FeS_4), molybdenite (MoS_2), native gold and other minerals.

Our research can be used to develop exploration "vectors" that determine where mining companies might prospect for the metallic resources that fuel our modern society. Gold, for example, is used not only in jewelry, but also in dentistry and in the manufacturing of scientific instruments, computers, and other electronic equipment. Copper, the mainstay of our modern technological age, has a yearly per capita consumption in the USA which has risen to almost 30 lbs. (13.5 kg) per person. The average growth in world consumption of copper has been ca. 4% per year (1993-1998). This implies a doubling in the demand for copper about every 18 years! Therefore, active mineral exploration is necessary to satisfy the world's demand for copper, as well as for gold, zinc, nickel, molybdenum and other metals This is true despite the facts that: 1. minable ore deposits are abundant and distributed world wide and 2. efforts to recycle are increasing (almost 40% of our domestic copper supply is from "old" and "new" scrap). Exploration for these and other metallic resources needs to become ever more sophisticated as economic mineral deposits (ore) become harder and more expensive to find. Our research team is, therefore, actively developing models of the sub-volcanic, hydrothermal (i.e., "hot water") processes that have formed fracture-hosted ore deposits of Cu,Au,Zn,Sn,Mo,Bi,W etc. in the geologic past, and that are active today beneath modern-day geothermal fields. Experiments performed in our lab by many students over the years (past students include Chris Tacker ('86), Steve Bouton ('90), and Steve Lynton ('92)) are consistent with a spatial and temporal association between oxidized granite (crystallized from granite magma with relatively high ratios of FeIII to FeII) and ore deposits rich in molybdenum and copper (e.g., the "porphyry copper deposits"), whereas more reduced granites host deposits richer in W and poorer in Mo and Cu. Pedro Jugo's ('97) data support the occurrence of Au deposits in association with granites that are oxidized, but not quite as oxidized as those associated with Mo deposits. These effects result primarily from the selective sequestration of ore metals in the dispersed minerals of the granitic rocks, a process that precludes the partitioning of ore metals into the exsolving "ore-generative" vapors and brines. Our work has also demonstrated the importance of chloride, and possibly sulfide, as agents for the transport of copper and gold in the volatile phases (Mark Frank, current; Tom Williams ('95)), as well as elucidating the conditions for REE transport by chloride-bearing magmatic volatiles (Marshall Reed ('95)). Phil Piccoli (now a research scientist here at the University of Maryland) and I have developed techniques to estimate the "paleo-magmatic" chloride concentration by the analysis of the mineral apatite (a major constituent of bones and teeth and a minor, albeit ubiquitous constituent of granitic rocks) by Electron Probe Microanalysis (Piccoli '92). These analyses also allow us to estimate the concentration of hydrochloric acid in these high temperature fluids. By virtue of our thermodynamic model for the behavior of HCl in magma-volatile systems, we can now predict the HCl concentration in a magmatically-derived vapor or brine given the composition of the magma, if the composition of recent magmatic activity is known from deep drilling into young granite or from recent proximal volcanic activity. The effects of acid alteration of rocks by magmatic fluids is a topic of recent and current research by Tom Williams, Mark Frank, and Matt Hall ('99). We have also done some physical modeling of how the magmatic volatile phases gain egress from the magmas: modeling suggests that three dimensional percolation networks of vapor in a melt/crystal matrix form when the proportion of vapor reaches a critical threshold. The predicted geometry of finer-grained, randomly oriented crystals of quartz and feldspar (grown from melt) and interconnected zones of wall-nucleated crystals (grown from the melt into pockets of vapor)

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DEPARTMENT NEWS: Faculty activities and honors

Michael Brown: This year I will complete my second and last term as Chair of the Department. In spite of the downturn in the economy and the financial cuts of the early 1990s, which dampened the euphoria of the enhancement program initiated by Governor Schaefer in the late 1980s, we have developed as a department during these 10 years, building on the foundation of the strong undergraduate program and the developing graduate program. It has been a privilege to be chair of such a dedicated department, and I am now looking forward to contributing in different ways in the future. I anticipate developing further the number of students involved in our research in the Laboratory for Crustal Petrology (http://www.geol.umd.edu/pages/faculty/BROWN/LCP/lcp.htm). Our interests are in three areas: high-temperature and ultrahigh-temperature metamorphism; crustal melting and the segregation, ascent and emplacement of granite; and, the pressure-temperature-time-deformation evolution and tectonics of metamorphic belts. For the past five years our principal field area has been Western Maine. Our work is funded in part by the National Science Foundation, which funding helped to support the graduate degrees of Rachel Pressley (MS 1997), Gary Solar (Ph.D. 1999) and Jinmei Tian (in the final stage of her MS). This work will continue with the Ph.D. studies of Paul Hackley, who joined our group this summer having completed an MS at George Washington University. The National Science Foundation also supports my work with Nathalie Marchildon, a Research Associate working on migration of granitic melt in the crust. For the future, I am expanding fieldwork activities to the Ribera Belt in Southern Brazil and I am beginning a study of ultra-high temperature metamorphism in Central Brazil. Four years ago, the Department of Geology sponsored and hosted the Third Hutton Symposium on the Origin of Granite and Related Rocks, an international conference that was hugely successfull and that greatly enhanced our reputation. At the Fourth Hutton Symposium on the Origin of Granites and Related Rocks, held this September in France, I was pleased to receive from the mayor of Clermont-Ferrand, on behalf of the city, a medal for my "contributions to the understanding of granites and related rocks", although this recognition must reflect also the success of our meeting four years earlier and the effort put forth by the whole Maryland team.

Philip Candela: Well, in addition to the activities mentioned above, I am now the supervisor of the senior thesis program that you all know (and love) very well. I am still teaching my thermodynamics course, and Phil Piccoli and I take a few research students every year "out west" to study granites and ore deposits. This year, we also have an ice hockey team (Team Volcano), populated by myself, Phil Piccoli, Nathalie Marchildon, Brian Stuller, and Ed Pak (who works on geology computers for Phil P.), along with some friends from outside the department. Alumni of our unofficial "Geology Department Ice Hockey Club" include Matt Hall ('99), Gary Solar ('99), and Paul Tomascak ('95).

Luke Chang: Dr. Chang is working on his second book "Industrial Mineralogy," which will be published by Prentice-Hall in 2000.

Christina Gallup: With every bit of good fortune comes some loss. I have the tremendous good fortune to be getting married to John B. Swenson, a modeler of basin-scale sediment-transport and hydrogeology, and to be joining him in accepting two tenure-track positions in the Geology Dept. at the University of Minnesota Duluth. Excited as I am about this new direction, the loss associated with leaving the colleagues, students, and staff in the University of Maryland Geology Dept will be difficult. Organizing the 25th Anniversary Celebration and meeting the Department's many wonderful alumni was a privilege and I regret that I won't get to arrange the next anniversary celebration! My research is also heading in new directions: a new collaboration takes me to Lake Malawi in October, and a newly funded grant from NSF takes me to New Guinea next year to sample fossil corals that have been pulled down in a subduction zone to greater than 2,000 meters depth. I will also be co-chairing a session at Fall AGU this year on "Climate and sea level change in the past 250,000 years."

Dazhi Jiang: It is my great pleasure to join the UMCP Geology community. While relocation has induced some transient non-steadiness in my life, academic and non-academic, with the great support from the faculty and staff in the Department, I am getting back on track. I am teaching structural geology at the moment and am enjoying it. I am setting up the laboratory for structural geology and tectonics here in the Department. My research continues to be on transpressional high-strain zones and deformation paths associated with natural deformations.

Alan Jay Kaufman: Since joining the UMCP Department of Geology staff in August of 1997, I have continued chasing the Snowball Earth hypothesis in the deserts of southern Africa and the western USA, as well as in the more temperate environments of Brazil and nearby Virginia. These stratigraphic and isotopic studies require the analyses of hundreds of samples from each sedimentary basin, forming the core of several senior thesis projects. Work completed by undergraduate seniors Tony Koval ('98) and Bill Richardson ('98) were featured in an article in Science titled "A Neoproterozoic Snowball Earth" later that year. In the following year Craig Hebert ('99) investigated the stratigraphic and isotopic systematics of a newly discovered cap carbonate in Virginia that supported the inference of Neoproterozoic glacial strata in our own back yard. Other UMCP undergraduates, including Stacy Poulos who was successful in getting a fellowship from the Biosphere2 project over the past summer, Laura Baker, Talia Walter, Blessing Asuquo, and Christine Missel have been employed in my laboratory — keeping my research moving forward

GRADUATIONS
Undergraduate Students

Below is a list of recent undergraduates who graduated, along with the title of their thesis and their thesis advisor.

Adrienne T. Freda, 1998, Analysis of phenocryst populations within a pumice and obsidian bearing rock (Piccoli)

Michelle N. Friedberg, 1999, Control of the morphology of two ponds on Bear Island near Great Falls, Maryland (Zen)

Theron C. Grim, 1998, Phosphorus availability and mobility in a sandy loam soil (Gallup)

Andrew T. Grenzer, 1998, Fractionation of biotite in Lembert Dome Dike, Tuolomne Intrusive Suite, Sierra Nevada, California (Piccoli)

Matthew W. Heber, 1998, Evaluation of hydrologic and sediment controls on riparian zone denitrification along the upper Patuxent (Prestegaard)

Craig L. Hebert, 1999, Origin of a Neoproterozoic carbonate sequence in the Marshall Quad of Virginia (Kaufman)

Lurick Jean, 1998, Determination of evaporation and groundwater seepage at Huntley meadows wetland and pond (Prestegaard)

Anthony G. Koval, 1998, The potential relationship of high biological productivity to the onset of the Neoproterozoic ice ages (Kaufman)

Peter D. Resh, 1999, Organic matter concentrations in modern and fossil *Acropora palmata* and *Porites asteroides* corals (Gallup)

William D. Richardson, 1998, Recession of Neoproterozoic ice ages (Kaufman)

Jerome O. Schorr, 1998, The Chesapeake Bay: Relationship between shoreline variability and underlying lithology (Segovia)

Abraham H. Silverman, 1998, An isotopic and geochemical study of sources, transport, and fate of nutrients associated with the pfiesteria on Maryland's Eastern Shore (Kaufman, Prestegaard)

Kathleen L. Wright, 1999, Hydrostratigraphy of tidal marsh sediments (Prestegaard)

when I am otherwise trapped behind a desk writing grants or teaching. I co-chaired (and gave talks) at special sessions on Precambrian oceans and atmospheres in Salt Lake City (AAPG), San Francisco (AGU), and Boston (Goldschmidt Conference) in the past two years. In addition, I was successful in obtaining University and NSF funds to purchase two gas source stable isotope mass spectrometers to add to the Isotope Geochemistry Laboratory arsenal. These instruments will be housed in a newly refurbished instrument lab in the Chemistry wing of Geology across from the new clean room and the existing TIMS facility. The renovation and delivery of these instruments should be complete by the end of the year. By later next year, this new lab will also house a multi-collector, inductively coupled plasma mass spectrometer (MC-ICP-MS) that Rich Walker and his geochemical colleagues here at Maryland were successful in funding through University and NSF funding. Finally, my research has been featured in several University publications including Outlook, the faculty and staff weekly newspaper, College Park, the University of Maryland Magazine, and College Park International.

Eileen McLellan: Dr. McLellan is on sabbatical as an American Geological Institute Congressional Science Fellow. She reports that the orientation for the Fellows was intense and all encompassing (not just science!) and that the possibilities for learning and participating in the political process are truly exciting. She chose to work in Senator Wyden's office (Oregon) as a Legislative Assistant, and is thriving in the fast-paced environment.

Phil Piccoli: This past year, through the efforts of a variety of people and organizations, we acquired a new electron microprobe. The electron microprobe allows us to obtain a complete chemical analysis on an area of a few square microns of rock! I obtained funding from the University, NSF, and the Department of the Army. The installation kept me quite busy for about 6 months, and was complete in August. Research has continued along a variety of avenues both inside and outside of the realms of traditional geology, and include studies of the distribution of ore-metals between crystalline phases, magmatic fluids, and felsic melts; studies of textures associated with granitic dikes; and, studies of cation and PCB distribution in otoliths from anadramous fishes. In addition to contributed submissions, two invited papers have been written this year; one on techniques to estimate Cl in felsic melts (published in Lithos) and a second on trace metal distribution in titanite (in review, Transactions of the Royal Society of Edinburgh: Earth Sciences). The second of these stemmed from a presentation at the 4th Hutton Symposium on the Origin of Granites and Related Rocks, held this past September in Clermont-Ferrand, France. As part of that conference, I helped organize a session on Granites and Metallogenesis. Furthermore, stemming from a special session at a recent AGU, I served as guest editor for a collection of papers on Textures in Rocks, a collection to appear in the Nov-Dec issue of American Mineralogist.

Karen Prestegaard: My students and I are currently conducting research on (1) river mechanics and morphology, (2) nutrient fluxes from watersheds to stream channels, and (3) hydrological and geochemical processes in wetlands. Our current funding comes from NSF, EPA, NOAA, NASA, and Maryland State Agencies. In 1998-1999, we conducted flood studies in the Dominican Republic, Iowa, Minnesota, and Maryland. We completed a 3-year study of the hydrology and morphology of Maryland streams for MDE, and we completed a study of nutrient fluxes and denitrification rates near incised stream channels in Maryland and Iowa. Much of this work was presented at AGU meetings in San Francisco and Boston and is being prepared for publication. In the period 1998-1999 I was pleased to see the following students complete their Ph.D. and M.S. theses: Jason Papacosma, Jackie Mann, Lori Keith, Jeremy Haas, Michael O'Connell, Jennifer Gunnulfsen, Barrett Smith, and Edward Stoner.

Robert Ridky: Bob Ridky has recently been appointed by the Governor to a third term as a member of the Maryland State Geological Survey Commission. Bob continues in an active role nationally in geoscience education serving on the Education Committee of the American Geological Institute, the Advisory Board for National Academy of Sciences' National Resource Center, and on NSF's National Visiting Committee for collaborative state-wide initiatives. Particular interest in providing for an adequate earth science teacher corps and in achieving the recommendations of National Science Education Standards has been keeping him busy with related papers, presentations and workshops for the geoscience community.

Peter Stifel: After thirty wonderful and fun-filled years at College Park, I retired from teaching in 1996. On that occasion, I was deeeply honored by my faculty colleagues petitioning of President Kirwan and the Board of Regents for Emeritus status, which they kindly granted. Since then I have been living at my farm in Easton, working hard outdoors and enjoying it immensely. Many alums who knew him will be saddened to hear that my helper and good friend Marion Huff was found to have pancreatic cancer about this time last fall and that he died last May. I have not yet gotten a new helper, so things are right busy these days at Hope. I'm serving actively on the boards of the Paleontological Research Institute (PRI) in Ithaca (where we're building a wonderful new 'Museum of the Earth"), the Pickering Creek Environmental Center here in Easton, the Sea Education Association (SEA) in Woods Hole and Cornell's Shoals Marine Lab on Appledore Island, Maine. I still try to make the 160 mile round trip to the GSW!! Much fun last summer winning a blue ribbon for my English captain's gig at the Mid-Atlantic Traditional Small Craft Festival in St. Michaels. My best wishes to all- Please stop by or write — Hope House, 25918 Voit Rd., Easton, MD 21601 or stifel@friend.ly.net.

Richard Walker: Richard Walker and associated postdocs and students have continued to work on a variety of projects. Collaborative work with postdoc Alan Brandon (headed to an assistant professor position at Northwestern University in January) has generated further evidence for a core contribution to the Osmium isotopic composition of some plume-derived melts. We have shown that a slight enrichment in an obscure isotope of Os (187) is coupled to a much smaller enrichment in an even more obscure isotope of Os (186) that is observed in nature only in asteroidal cores. This is an important discovery, because if the interpretation is correct, it is proof that at least some plumes originate at the core-mantle boundary. Work done by postdoc Harry Becker has shown that the element Re is lost from downgoing slabs at subduction zones as they dewater. This is an important finding in understanding the mass balance of this element in the asthenosphere and lithosphere. A long term project examining the Os isotopic composition of ophiolites from around the world has involved various students including MS recipient Asuka Tsuru (now at the University of Alberta) and undergraduate Blessing Asuquo. This work has elucidated some interesting aspects about the evolution of the earth. The main finding is that ophiolite samples ranging in age from 1.2 Ga to recent, with few exceptions, have Os isotopic compositions that are similar to chondritic meteorites. This indicates that the upper mantle has evolved like chondrites from the standpoint of highly siderophile elements like Re (the parent element) and Os (the daughter elements). The best explanation for this is that these elements were added to the mantle after the separation of the earth's core. This means that the platinum and palladium in your catalytic converter (two other highly siderophile elements) is likely of an "extraterrestrial" origin.

Ann Wylie: September 1999 begins my 28th year at the University. I really enjoyed seeing many of you who have been students here over these many years at our 25th anniversary celebration. For those of you who could not come, I hope you will drop by and visit if you are in the area. Last year, I took the job of Acting

GRADUATIONS

Graduate students

William S. Greenwood, M.S., 1998 "A Mineralogical Analysis of Fibrous Talc" (Wylie)

Jennifer M. Gunnulfson, M.S., 1999, "Hydrologic Processes in the Riparian Zone of an Urban Wetland" (Prestegaard)

Matthew Hall, M.S., 1999 "Reactions between a Sulfate-Bearing, Vapor-Undersaturated Brine and the Mineral Assemblage Potassium Feldspar-Albite-Quartz-Tremolite-Apatite at 500C and 50 MPa" (Candela)

Diane J. Hanley, M.S., 1998 "Overland Flow Evaluation of Lava Flow Planform" (Wylie)

Lori Anne Keith, M.S., 1998, "Seasonal Geochemical Changes in Surface and Groundwater and Sediments in a Riparian Wetland on the Maryland Coastal Plain" (Prestegaard)

Jacqueline M. Mann, 1998, "Hydrologic Control of Inorganic Sulfur Cycling in Freshwater and Tidal Wetlands with High Iron Concentrations" (Prestegaard)

Michael E. O'Connell, Ph.D., 1998 "Combined Hydrologic and Geochemical Study of Storm and Seasonal Delivery of Solutes to Streamflows" (Prestegaard)

Barrett L. Smith, M.S., 1998 "The Implications of Tides and Local-Scale Heterogeneities on Groundwater Contribution to a Freshwater Wetland in Maryland" (Prestegaard)

Gary S. Solar, Ph.D., 1999 "Structural and Petrologic Investigations in the Central Maine Belt, West-Central Maine, with particular reference to the migmatites" (Brown)

Charles E. Stoner IV, M.S., 1999 "Flow Resistance in Gravel Bed Channels" (Prestegaard)

Martitia P. Tuttle, Ph.D., 1999 "Late Holocene Earthquakes and their Implications for Earthquake Potential of the New Madrid Seismic Zone, Central United States" (Wylie)

Mark Watson, M.S., 1999 "Effects of Intergrowths on the Physical Properties of Anthophyllite" (Wylie)

Associate Dean in our college. I intended to stay a year but I am still here. I have enjoyed turning my attention to university-wide issues in undergraduate education. Even so, I still teach Optical Mineralogy and maintain some research activity. I have just finished a paper which is in press at American Mineralogist titled "The tremolite-actinolite-ferroactinolite series: systematic relationships among cell parameters, composition, optical properties and habit and evidence of discontinuities. My co-author is a former student, Jennifer Dennis Verkouteren.

E-an Zen: E-an Zen continues to spend time figuring out the history of development of rock terraces and bedrock-bound entrenched channels of the Potomac river. During the past year, however, his principal activities are related to the formulation of a set of Guidelines for Sustainability Literacy, in collaboration with Dr. Allison R. Palmer, and under the auspices of the ad hoc Committee on Critical Issues of the Geological Society of America. The Guidelines are intended, not to tell people what they should do, but to point out how personal choices could affect the complex web, both social and natural, that constitutes the underpinning the world as a habitat, and thus affect its long-term viability. These Guidelines are aimed especially at school teachers and school children. Zen invites interested parties to get in touch.

Research Scientists and Post-doctorate staff activities and honors

Harry Becker: I'm currently spending most of my time teaching GEOL445 (Geochemistry) and maintaining the TIMS and clean labs. The remaining time, I am working on the development of mass spectrometric and chemical techniques to separate ruthenium and molybdenum from iron meteorites and analyze their isotopic compositions. Ruthenium has two isotopes (98Ru and 99Ru) that are decay products of extinct technetium isotopes (98Tc with a half life of 4.2 Ma and 99Tc with a half life of 0.216 Ma), whereas 97Mo is a decay product of extinct 97Tc (half life 2.6 Ma). If sufficient Tc was present and still "alive" during the formation of asteroidal cores (many iron meteorites represent fragments of such cores) in the early solar system, then anomalies in the abundance of 98Ru, and to a lesser extent 97Mo, may occur in irons, relative to our terrestrial standards. This research may provide additional constraints on relative time differences of core formation in asteroids and planets, and may help to constrain astrophysical production models for 98Tc and 97Tc. For more information on my other research check out the September 1999 Special Issue of Chemical Geology "Interactions between slab and sub-arc mantle: Dehydration, melting and element transport in subduction zones", guest-edited by Dave Draper, Al Brandon and myself. In one of the next issues of Chemical Geology we have another paper that represents the first comprehensive study on the fractionation of incompatible elements in eclogites and blueschists and the implications for element fluxes in subduction zones, and another paper on Re- and Os-loss during dehydration of eclogites is in press in EPSL.

Thomas Holtz: Tom Holtz has recently moved from his two year stint as Undergraduate Director to the Directorship of a brand-new program for College Park Scholars. The CPS Earth, Life & Time Program uses the studies of historical geology, paleontology, and evolutionary biology to introduce first and second year students of all majors to the way in which scientists study the natural world; collect and interpret data; and disseminate knowledge to the public. With Dr. John Merck (Assistant Director of Earth, Life & Time, a vertebrate paleontologist from University of Texas, Austin), Tom has led students to local sites of geologic interest (Jug Bay wetlands, Chesapeake Beach, Sideling Hill road cut, the Sandy Mile outcrop, etc.), and plans are underway for some trips to more distant localities: in particular, various spots in Arizona (Grand Canyon, Petrified Forest, etc.) and the Galapagos Islands. He continues to teach his ever-popular dinosaur course, as well as Historical Geology. In the Fall of 1999, Tom has two senior undergraduates (Jason Kenworthy and Timothy Tarvin) whose senior thesis projects relate to paleontology (theropod dinosaur claw morphometrics and shark tooth serration systematics, respectively). Tom's own research in theropod dinosaur biology, evolutionary relationships, and functional anatomy continues, and has been featured in recent issues of Science and elsewhere. In February he was an invited speaker at the Ostrom Symposium held in honor of his thesis advisor (Dr. John Ostrom) and John's work on the origin of birds. In the public arena, Tom served as consultant on carnivorous dinosaurs for the BBC documentary series Walking with Dinosaurs. This series, which will not air in the U.S. until April, had the highest ratings of a science-based program in British history.

Bill Minarik: Bill is continuing to spend time at the University of Maryland teaching and advising, and at the Carnegie Instutution of Washington, where he has access to the presses and furnaces necessary to create the conditions of the crust and mantle experimentally, from shallow crust to pressures in excess of 270,000 atmospheres pressure (or about 700 km depth in the Earth). Bill received his Ph.D. in 1994 from Rensselaer Polytechnic Institute in Troy, NY, working with Dr. E. Bruce Watson, after receiving a M.S. from the University of Washington and his B.A. in Chemistry and Computer Science from St. Olaf College. He then was a post-doctoral researcher at the Lawrence Livermore National Laboratory and at Carnegie. In addition to mentoring summer research interns at these institutions, Bill has previously taught as part of his graduate education. Bill's research is concentrated in two areas: transport properties of melts and fluids, and trace element partitioning between minerals and these mobile phases. The problems addressed with these experiments include: movement of small fractions of melt from its source region, the formation of the Earth's metallic core, fluid-rock interaction in blueschist-facies rocks of California, trace element partitioning between minerals and melts as probes of source composition and melting processes, and multicomponent chemical diffusion.

Nathalie Marchildon: I joined the Geology Department in June '99, as a research associate with Dr. Michael Brown. As art of the Laboratory for Crustal Petrology team, I study the nature of melt segregation processes in crustal rocks. I just finished my Ph.D. at the University of British Columbia, where I worked on the tectonic and metamorphic evolution of the southern Canadian Cordillera, and the flow of high-temperature hydrous fluids, so the fate of melt in crustal environments is a new and exciting, yet not completely unfamiliar field of studies for me. I am currently concentrating my research efforts on migmatites from a contact metamorphic aureole in central Maine. A lot of my research involves the characterization of spatial distribution of material thought to have solidified from melt in these rocks. Some of the methods I have applied to this end include microscope work, electron microprobe mapping, and high resolution computed tomography (HR CT-scan). In September, I presented my early results at the Fourth Hutton Symposium on the Origin of Granites in Clermont-Ferrand, France. Our work continues on the characterization of the mineralogical, textural and structural changes that accompany melting and melt movement in crustal environments.

Graduate student activities and honors

Jonathan Angier: In 1999, presented research into the mechanisms that deliver nitrate from groundwater to streams across riparian zones at the Spring AGU meeting in Boston, the American Society of Agronomy (AGA) meeting in Salt Lake City in November, and at the Chesapeake Bay Day at the USDA, Beltsville in September.

Kate Folk: Traveled to Iowa to study the 1998 Raccoon River floods. Prepared a presentation for the fall 1998 AGU meeting in which we evaluated the effectiveness of the 1993 and 1998 floods on channel morphology. Funded as part of NASA grant to study velocity distributions and flow resistance in boulder-bed streams for Ph.D. research.

Mark Frank: 1998-1999 Distinguished Teaching Assistant Award; Center for Teaching Excellence and the Graduate School; University of Maryland Research Award; 1999 Society of Economic Geologists, BHP Student Research Grant; Presented papers at GSA (1998, 1999), Spring AGU (1999), and the Fourth Hutton Symposium (Clermont-Ferrand, France) (1999); First author on paper with Philip Candela and Philip Piccoli: (1998) "K-feldspar-Muscovite-Andalusite-Quartz-Brine Phase Equilibria: An Experimental Study at 25-60 MPa and 400-550 C." Geochim. Cosmochim. Acta, 62, 23/24, 3717-3727.

Donna Gunderson: Awarded Research Training Group Traveling Fellowship (an NSF Traineeship Program) to the University of Minnesota for Fall 1998. Defended thesis "A Sr/Ca – Sea Surface Temperature Calibration for the modern coral, *Acropora Palmata*." on December 1, 1999.

Ted Hegnauer: Awarded National Estuarine Research Reserves Graduate Research Fellowship, a two-year fellowship from NOAA Office of Ocean and Coastal Resource Management, for project titled "Temporal Spatial Variability in Surface Water and Ground Water Interactions in a Tidal Freshwater Marsh."

Jackie Mann: Awarded an EPA STAR Fellowship to work on a Ph.D. thesis on the influence of sediment chemistry on denitrification reactions.

Michael O'Connell: O'Connell is working with Dr. Prestegaard researching the effect of geomorphic change in agricultural watersheds of Maryland, Iowa, and Minnesota on nitrate concentration (and other solutes) in discharge from those watersheds. This work builds upon hillslope and small watershed-scale work that was the focus of his dissertation research. In that research, variations in nitrate concentrations in surface and sub-surface waters of a Maryland Coastal Plain watershed were found to be strongly correlated to geomorphology and sub-surface geology. O'Connell is also a faculty member at Johns Hopkins University, Kreiger School of Arts and Sciences Part-time Graduate Program in Environmental Science.

Gary Solar: Dean's Award for Excellence in Teaching; Presented "Contrasting patterns of strain and kinematic partitioning of flow during Devonian oblique contraction in the Central Maine belt, northern Appalachian orogen, USA" at AGU; Paper with Mike Brown published in April issue of the Canadian Mineralogist entitled: "The classic high-T — low-P metamorphism of west-central Maine: Is it post-tectonic or syn-tectonic? Evidence from porphyroblast-matrix relations."

Bryan Stuller is undertaking an integrated field and experimental study of the distribution of a variety of ore-metals (Ni, Co, Mn, Zn, Ag, Au, Mo and W) between pyrrhotite and felsic (rhyolitic) melts. He spent part of April digging samples of the Bishop Tuff out from under two feet of snow, and is now well underway in the experimental portion of his work. ⌘

ALUMNI NEWS:
Reports from our Alumni of their current activities

Douglas A. Bell (1987) currently works for EPA Headquarters within the office of the Assistant Administrator, Office of Solid Waste and Emergency Response. There in the Federal Facilities branch he leads national efforts on rule making and development of risk methodology for the Department of Defense. In his nine years with the EPA, he has also served as Special Assistant to the State of Florida's Program Administrator and managed environmental cleanup activities in Kentucky and Tennessee. In 1991, he founded the EPA Region IV Geological Society that is still going strong. He is also happy to report that his wife Janelle completed medical school and residency and is a doctor practicing in southern Maryland. His new hobbies include taking care of our 22-month-old son Connor, building houses, and restoring antique furniture.

Eric D. Eisold (1982).graduated from UMCP (with a very accomplished geologist and good friend, Eric Dougherty). Married (June 1983) to a wonderful wife, Cathy Monahan, an education major at UMCP. 1983-1985, Engineering Geologist for EBA Engineering (Baltimore). 1985-1987, Engineering Geologist for Woodward-Clyde. 1987-1990, Engineering Geologist for the Washington Metropolitan Area Transit Authority (WMATA). 1990 to present, Engineering Geologist for Woodward-Clyde. Along the way he has become a proud father of three beautiful children, authored several technical papers, made presentations, provided expert witness testimony, and served as the Section Chairman of the Baltimore-Washington-Harrisburg Section of the Association of Engineering Geologists. He has also had the pleasure of working with other Maryland alumni including James Darmody, Tim King and Mitch Schloner. He is registered in the state of Delaware as a professional geologist. His current goal is to become a registered professional engineer. He unfortunately had to work on a subway project in San Juan, Puerto Rico at the time of the 25th Anniversary Celebration.

William C. Lynch (1978) received his MS from the University of Utah in 1980 in Igneous Petrology and Economic Geology and went to work in the hard-rock mining industry in exploration for gold, molybdenum and base-metals with assignments across North and South America, the Caribbean and Papua New Guinea. Currently he is working for Canadian gold miner Viceroy Resource Corporation as North American Exploration Manager. He is married to non-geologist, Elizabeth Wilson. They have no children but do have a border collie named "Ru" (age 9). Sends "saludos" to all.

Diane Simpson Unger (1980)/Stuart Unger (1980) In 1984, Diane Simpson and Stuart Unger were married in Denver, Colorado, after having both independently moved to Colorado for employment. Diane worked in the geophysical data processing industry for quite a few years, while Stuart worked as a consulting well-site geologist throughout the Rocky Mountain Region. After 15 years of ups and downs in the Rocky Mountain energy business, they relocated back east. They now live the good life at their country place in Virginia's Shenandoah Valley.

Diana vanElburg-Obler (1987) is returning to the U.S. and resuming her career after 6-1/2 years sabbatical in the Netherlands. She is married to Herman vanElburg (a Dutch geohydrologist). They are the parents of two bilingual children (Erik, 6 1/2 and Sonja, 5) who share their parent's love of travel. Since graduation (1987), she has worked as a geologist for the Smithsonian Institution's National Air & Space Museum. Following that, she worked on various remote-sensing projects for NASA, as a programmer/analyst (SAR/STX) and a senior technical specialist (Hughes/STX).

Marc Yalom (1982) currently works at Waste Management, Inc. (Livermore, CA) managing closed hazardous and municipal waste landfills: overseeing long term care, negotiating legal liabilities, and managing environmental remediation projects. In 1991 he attained California Registered Geologist status, and passed state certification as a Hydrogeologist in 1996.

Cynthia "Cindy" Zeissler (Poston) (1986) is happily married 8 years, no kids. "While completing my last year at Maryland, took a student job at the National Bureau of Standards (NBS), now the National Institute of Standards and Technology (NIST). What started out as a

OUTREACH:
Internships for students

The education of our Geology majors is not limited to what they learn in the Department. Many take summer internships - an excellent way to explore career opportunities. If you know of or are able to create an internship that would be of interest to Geology students, please let us know!

Field Camp Fund/Field Trip Fund

If you are interested in helping to support current Geology majors, contributing to the Field Camp Fund would make an important contribution to undergraduates' ability to participate in that unique aspect of an education in Geology - Field Camp! We are always trying to maximize the amount of exposure undergraduates get to field geology and so we are also setting up the Field Trip Fund to help the Department sponsor more Geology field trips. Checks for the Field Camp Fund, Field Trip Fund, or for the general Department fund can be sent to Department of Geology, University of Maryland, College Park, MD 20742, and should be made out to the University of Maryland Foundation (please write on the check which fund it should go to). ⌘

student position to count asbestos fibers for reference standards, eventually led to a permanent position as a Materials Science Microscopist specializing in nuclear methods. Publications include those that deal with uranium quantification and ultra-low radioactivity quantification and "hot" particle characterization. Memberships include the American Chemical Society (nuclear analytical, and information divisions), Sigma Xi, Microbeam Analysis Society, and Mid Atlantic Microbeam Analysis Society. Although very satisfied with my work, I deeply miss geological studies, and most especially, conjecturing about some outcrop in the middle of nowhere with others of similar hear. Eager to lean more about the geology of Maryland in situ, and admittedly embarrassed by how much I have forgotten, I welcome contact with anyone of similar interest who might want to get together for exploratory relaxed hikes to learn more about the Piedmont and surround areas. I regret that I had to miss the Geology Department's Anniversary. During the celebrations I was vacationing with my husband in the San Juans of Colorado." ⌘

GEOLOGY ALUMNI MISSING FROM OUR DATABASE LIST

Alexander, Michael
Alfaro, Sharon
Arkell, Brian
Atcheson, John
Atelsek, Paul
Baslom, Alan
Batra, Persaram
Bauerle, Michael
Behun, Curtis
Brack, Patti
Brosky, Ron
Brown, Shari
Bugenhagen, Robert
Burgess, Jerry
Burney, John
Caugh, Valerie
Cerniglia, Vicent
Cisneros, Rosana
Coleman, Jerry
Collins, Timothy
Costinett, Mat
Dimarzio, John
Doudnikoff, Catherine
Drummond, Walter
Ealy, Carl
Eagar, Charles
Faux, Robert
Feldmann, Steven
Filar, Mark
Frasch, Mark
Garaci, Phil
Gener, Buzz
Geston, Richard
Grandy, Jesselyn
Greenbaum, Susan
Hafer, Lee
Hannan, Douglas
Hecht, George
Hedgman, Cheryl
Herlong, Chris
Higgenson, Steve
Higgins, Martha
Hightower, Jeff
Hirtle, Eric
Hogue, Robert
Hussein, Art
James, Johnny
Joy, Richard
Kempa, Martha
Krasnokutsky, Victor
Kraus, Hugh
Krongold, Susan
Kyle, Dale
Levin, William
Liposchak, Richard
Liu, Huifang
Lucas, Carol
Mahr, Francine
McCollum, Tom
McGann, Chris
Miner, Jonathan
Montgomerie-Neilson, Elizabeth
Moore, Tim
Noeller, Bernard
Noeller, Paula
Nolan, Patrick
O'Carroll, Charles
Page, John
Ray, Dennis
Rhodes, Letitia
Richardson, Judith
Rooney, Locke
Rosenfeld, Chris
Rosenthal, Barbara
Schloner, Mitchell
Schmidt, Bill
Seiss, Scot
Shumaker, Richard
Skelly, Thomas
Smith, Melissa
Smith, Wendy
Sorenson, Margaret
Statler, Richard
Steel, Joseph
Stein, Clifford
Swingle, Kathleen
Symborski, Mark
Thompson, Jess
Travisono, Jeanne
Unger, Stuart
Waitzenegger, Bernard
Wallace, Robert
Walters, Clifford
Ward, Larry
Weingelt, Herbert
Widman,David
Wolff, Evan
Woodworth, Marshall
Wooley, Robert
Wulff, Andrew

SPOTLIGHT ON THE FACULTY
...continued

have now been found in many ore-related granites (see the associated figure at http://www.geol.umd.edu/~candela/rock.gif). Our work on granite textures started with Kent Ratajeski's ('95) Masters thesis, and continues with recent work by Wei-Li Deng (when she was a student at Montgomery Blair High School in Silver Spring), and by senior thesis researchers Dan Earnest and Keli Mandeville (current) and Bryan Stuller ('96, and current). Our work, and the work of our students on problems of high-temperature geothermal systems and the formation of ore deposits would not be possible without grant money we have obtained from the Department of Energy and the National Science Foundation. Our research continues, and we encourage our alumni to keep track of our progress in research and graduate and undergraduate education through our web site, which currently can be found at: http://www.geol.umd.edu/pages/facilities/lmdr/lmdr.html ⌘

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University of Maryland
Department of Geology
Phone: 301-405-4082
Fax: 301-314-9661
e-mail: geology@geol.umd.edu
Mail:
Department of Geology
University of Maryland
College Park, MD 20742

or find us on the world wide web at:
http://www.geol.umd.edu

Alumni Pics...

Alumni rise to the top on the field trip to Great Falls for the 25th Anniversary Celebration

Lots of Smiles!

If you have some Alumni photos you would like to share (go ahead, embarrass your friends!), send them to us and we'll make sure that you get them back!

UNIVERSITY OF MARYLAND
Department of Geology
College Park, MD 20742