

UMASS AMHERST geosciences

Summer 2011



A LETTER FROM THE DEPARTMENT HEAD

NEW FACULTY

Michael Rawlins	6
David Finkelstein	6
Isla Castañeda and Christine Hatch	6

IN MEMORIAM

Julie Graham	5
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AROUND THE DEPARTMENT

5-College geology field trips	3
Rausch mineral collection	4
Hartshorn Lab opens	5
A birthday tribute	7
New Environmental Science program	8
New Environmental Geography Concentration	8
Trail of Time opens	8
Lake El'Gygytgyn	9
The Future of Ocean Drilling	10
Morrill Day	11
News from around the department	12
News from the State Geologist (Massachusetts Geological Survey)	18

DEPARTMENT GIFTS

Student award winners	14
Thanks to our donors	15
Memorial funds	16



It has been an eventful one and a half years since I became Department Head (January 2010). I still lean heavily on my predecessors **Mike Williams** and **Laurie Brown** for advice and guidance; this job would be a chore if it weren't for all the wonderful faculty colleagues, staff, and students! We are also fortunate to have a supportive Dean in **Steve Goodwin**, who has worked for the USGS and was a faculty member and Department Head in Microbiology before becoming Dean. The merger of the College of Natural Sciences and Mathematics with the College of Natural Resources and the Environment nearly two years ago has been very good for the Department of Geosciences with growing synergies and collaborations in the newly configured **College of Natural Sciences**. Noteworthy is the restructuring of the Environmental Science Program on campus featuring a prominent role for Geosciences with **Richard Yuretich** serving as its Co-Director. **Steve Burns** serves as Associate Dean for Research in the new College of Natural Sciences.



Mark Leckie on the famous Hutton's Unconformity at Siccar Point, Scotland. Here James Hutton solidified his hypothesis that Earth is mind-bogglingly old.

We are excited to announce a first ever on-campus **Geosciences Alumni Reunion** for the weekend of **October 14-16, 2011** here in Amherst. Please mark your calendars and join us for the entire weekend, or just the Saturday dinner. Details can be found on the next page.

The low point of recent years was the loss of **Julie Graham** (see the remembrance to Julie on page 5). She died suddenly in April 2010 while returning from a leave of absence in Australia and a lecture at the University of Arizona. Her death was the consequence of the aggressive treatments she had to endure in fighting throat cancer. Julie's loss has been a significant blow to the human geography program, but a renewed focus on issues related to environmental geography and human dimensions of global change is playing to other strengths in the Department and across campus.

We see many new and exciting developments in our near future. **The Hartshorn Laboratory for Quaternary Research** will officially open at the start of the Fall 2011 semester. The lab features state-of-the-art facilities and instrumentation for the analysis of geologic samples and sediment cores (see story, p. 5) **Mike Rhodes** was the lead PI to acquire an XRF core scanner, which will be housed in the Rhodes (Ronald B. Gilmore) XRF facility under the expert care of **Pete Dawson**. Planning is underway to renovate space to move the **Climate System Research Center** back to Morrill Science Center (housed across the street in Hasbrouck for more than ten years), as well as an expanded **geochemistry facility** in Morrill 4 South and a new **Department classroom**.

We are actively trying to grow our connections with the oil and gas industry. ExxonMobil has recently hired three of our MS students: **Kat Plourde** (Dave Boutt), **Matt Walsh** (John Hubert), and **Laura Dair** (Michele Cooke); **Brooke Olson Carson** (Mark Leckie) was hired by Chevron. In addition, several of my students have had summer internships with BP in Houston

Continued on next page

SAVE THE DATE FOR...
THE FIRST GEOSCIENCES ALUMNI REUNION!
 WEEKEND OF OCTOBER 14-16, 2011
 UMASS-AMHERST CAMPUS

WHAT WE'VE GOT PLANNED:

Friday Oct. 14: alumni and friends of the Department arrive, attend **Geosciences Lecture Series**, followed by **Safety Committee** at the University Club (dinner at University Club or local restaurant)

Saturday Oct. 15: morning **Symposium on Geosciences Careers** featuring Geosciences alums – lunch – afternoon **Geosciences Open House** – Happy Hour – Dinner in the Amherst Room on the 10th floor of the Campus Center

Sunday Oct. 16: optional local field trip

Would you like to give a presentation about science, your career or your geosciences experience?

WHEN WAS THE LAST TIME YOU
 WERE BACK ON CAMPUS? WHEN
 WAS THE LAST TIME YOU SAW
 YOUR OL' PROFS?

Reunite with former classmates
 Hear some new and used jokes from Don Wise
 Meet current faculty and students
 Learn about the exciting field and laboratory science
 happening in the Department today
 Celebrate the opening of the Hartshorn Laboratory
 Honor our recently retired faculty and emeritus faculty
 Come and see how much has changed (or not) in Morrill
 Science Center



PLEASE PLAN A TRIP BACK TO AMHERST THIS FALL...
 WE LOOK FORWARD TO SEEING YOU!

Note: This is also Family Weekend on campus, **so please do not delay in making your motel/B&B reservations.**
 See the UMass Geosciences webpage for a link to a list of local motels and bed & breakfast establishments in the area.

<http://www.geo.umass.edu/>

RSVP or questions to Mark Leckie at mleckie@geo.umass.edu or 413-577-2270



THE COLLEGE OF
 NATURAL
 SCIENCES

DEPT. HEAD LETTER, CONT'D.

in recent years: **Steve Nathan**, **Emily Browning**, **Kendra Clark**, and **Chris Lowery**. Chris Lowery and I currently have a Cretaceous shale gas project in West Texas with BP. **Steve Petsch** has worked on shale gas and coal-bed methane in the Appalachian, Michigan, and Powder River basins, and **Michele Cooke** has investigated fracture network development within clastic and carbonate reservoirs. The Department retains its field-oriented Geology program that includes structure, Earth materials, critical thinking, problem solving, and writing. However, we also have additional breadth in modeling, geomechanics, fluids, analytical tools, an Earth systems approach, and in general greater quantitative training. We are interested in placing more of our well-trained graduate students in hydrocarbon

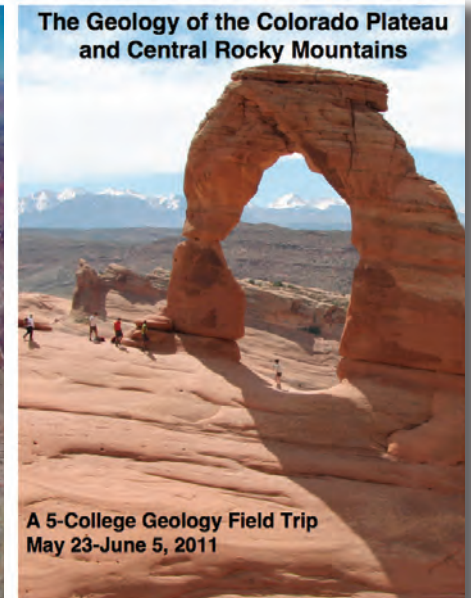
and environmental industry jobs. Please keep your alma mater in mind when recruiting bright young prospects; we can deliver.

Lastly, we are proud to announce two initiatives for minority student recruitment funded by the generous gifts from **Randolph "Bill" Bromery**, former UMass Chancellor (1971-1979) and Geology Professor, and his wife **Cecile**. This fall we will place recruitment ads for a **Randolph and Cecile Bromery Minority Graduate Fellowship** and a **Randolph and Cecile Bromery Minority Undergraduate Scholarship**. This is a great opportunity to attract underrepresented minorities into the geosciences, particularly African Americans, and to foster a diverse community of undergraduate and graduate students in the Department of Geosciences.

FIVE COLLEGE GEOLOGY FIELD TRIPS

By Mark Leckie

For the second year in a row, UMass Geosciences faculty led a 2-week, 5-College geology field trip across the Colorado Plateau and central Rocky Mountains (last week of May/first week of June). Forty-eight students and faculty participated in 2010, and forty-two in 2011. **UMass** was represented by **David Boutt** and **Mark Leckie** on both trips, along with **Sheila Seaman** and **Mike Williams** in 2010; **Will Ouimet** from **Amherst College** (now at UConn) participated in 2010, and **Steve Dunn** from **Mt. Holyoke College** co-led the trip in 2011. Prior to these trips, we ran a weekly evening seminar during the Spring Semester with lectures on diverse aspects of western geology that included other Geosciences faculty: **Julie Brigham-Grette**, **Michele Cooke**, **Dave Finkelstein**, and **Don Wise**. The



The 2010 group on top of Pike's Peak.

of Time" (1 m = 1 million years representing the age of the Earth and our Solar System). The NSF and National Parks-funded "Trail" officially opened in October 2010 and is the brainchild of Mike Williams (see story, p. 8). Logistically, what made the trips particularly efficient and affordable were the teams of three Camp Bosses, who coordinated the lion's share of food preparation and shopping, and the teams of eight graduate students, who drove four vans and two U-Haul trailers across country (we had to rent additional vans out west). Field-based adventures such as the Colorado Plateau expedition are life-changing experiences, and by all accounts, the trips were a huge success. We hope to run a similar trip as a Departmental fund-raiser in the future; stay tuned.

spring seminar also provided an opportunity for the participating students to work in groups and prepare chapters for the field trip guidebooks (see below). Each trip traversed more than 2000 miles across Arizona, Utah, and Colorado. We camped and hiked some of this country's most beautiful national and state parks, monuments, and forests including Grand Canyon, Monument Valley, Goosenecks of the San Juan (photo below), Arches, Canyonlands, Capitol Reef, Bryce Canyon, Kodachrome Basin, Mesa Verde, Great Sand Dunes, Rocky Mountain National Park and the San Isabel National Forest east of Independence Pass and Colorado's highest peak, Mt. Elbert. In 2010 we concluded the trip with a drive to the top of Pike's Peak near Colorado Springs (photo left). The geology is spectacular; the memories will be enduring! At the Grand Canyon we hiked part of the recently opened 4.6-km long experiential learning path along the South Rim called the "Trail



2011 participants at Goosenecks of the San Juan State Park near Mexican Hat, Utah.

SPECTACULAR MINERAL SAMPLES COME TO UMASS-GEOSCIENCES

By Mike Williams

The Department of Geosciences is now the home of a stunning collection of mineral samples. The approximately 250 minerals are part of the collection of the late Dr. Marvin Rausch, former Professor of Chemistry at the University of Massachusetts. Dr. Rausch donated part of his collection to the department before his death in 2008. After his death, a long-standing family friend and fellow mineral collector made it possible for about 200 more specimens to be donated to our campus.

classes and as independent study projects, undergraduate and graduate students will help to prepare posters to serve as the backdrop for a collection of related specimens. They might explain the geology of a mineral locality, the history of an ore deposit, or possibly the tectonics of a host terrane. Some posters may summarize the uses of the minerals or their petrologic applications. Others will focus more on the geography, politics, or economics of the mineral deposit. The idea is to change the minerals and the posters regularly, so that there is always something new to look at, and so that geosciences students are continually involved with communicating mineral science to the public. Thousands of students and families pass through the hallways of Morrill each year. The collection is a superb opportunity to communicate the nature, breadth, and wonder of the Geosciences.



Claire Pless, Chris Koteas and Michael Williams in front of the handsome cases that now display some of the Rausch mineral collection.

Marvin Rausch had a life-long love of minerals, and his minerals represent many decades of collecting and trading. The minerals were housed in the basement of the home of Marvin and Jane Rausch in Amherst, along with a large array of prizes, trophies, and awards from mineral shows around the country, including many from the famous Tucson Gem and Mineral Show.

Those of us who were fortunate enough to meet Marv Rausch knew him as a kind person, a devoted scientist, and a connoisseur of minerals. The department will be forever grateful for his generosity. We thank Jane Rausch for her warmth and kindness during the transfer of the minerals to the Department of Geosciences, and for her donation of Dr. Rausch's extensive collection of mineralogy reference books. Thanks also to Bill Harrington for his donations for cabinet repair and to John Sweeney for his craftsmanship. Finally thanks to former graduate student Anna Keskula and 2011 Geology Senior Claire Pless for arranging our current displays and to all of the students who helped in the packing and transfer of the specimens.


What makes the Rausch collection so special is the size and diversity of the specimens. Most samples take two hands to hold, and most have large, euhedral, stunningly colorful crystals. Four large display cases of minerals are now on display in the newly renovated Optical Microscopy Laboratory in the department. The cases were also donated by Marvin Rausch. The cases and lighting were renovated by John Sweeney, and funds for the renovation were donated by Bill Harrington of Amherst. It is inspiring for students and faculty to work and teach in the Microscopy Lab with these spectacular specimens on display.

The remaining collection will be part of a new dynamic display for the halls of Morrill Science Center. Perhaps twenty or more new cases, each holding four or five specimens, will be hung in the hallways. As part of the honors portion of some



Mandy Toong and Sheila Seaman having a closer look at some of the stunning specimens in the collection.





Like us on Facebook! Click [here](#) or search for the **UMass Geosciences** page on Facebook to see what people in the department have been up to, and stay informed about recent activities and upcoming events.

Also be sure to visit the Geosciences department webpage at <http://www.geo.umass.edu> for more news and updates, and check out <http://blogs.umass.edu/geoblog/> to read the Geosciences department blog on the UMass Amherst website.

JULIE GRAHAM REMEMBERED

By Eve Vogel, with help from Kath Gibson, Leo Hwang-Carlos and Mark Leckie

Longtime faculty member **Julie Graham** passed away on April 4, 2010. Julie had been in our department since she arrived as an Assistant Professor in economic geography in 1984. She played a paramount role in helping to shape the human geography side of the Geosciences department over her 26 years, including serving as Associate Department Head for Geography between 1999 and 2006. At UMass, she also worked closely with colleagues and students in Economics, Women's Studies, Labor Studies, Education, Political Science, and Anthropology. Her passing is an acute loss for the department, UMass, and for the many she touched around the world.

Julie Graham was both a powerhouse of intellect, and a grounded humanist who cared about the victims of mindless capitalism and domination. Her profound intellectual contribution was to offer hope in a deeply flawed world. This hope inspired students, national and international colleagues, and community organizers around the globe. Together with her collaborator **Katherine Gibson** she developed what they came to call a post-capitalist politics: a politics in which the many economic systems and relationships that are different from capitalist exploitation are noticed, made visible, supported, and encouraged. Once taught to notice this rich complexity, Julie's students and colleagues began to see possibility and diversity all around them. The role of the academic became not only to critique and analyze, but also to pursue and support possibility.

Julie's scholarly achievements included more than fifty

publications, many with co-author Katherine Gibson under the blended pen name J.K. Gibson-Graham. One of their two major books, *The End of Capitalism (as we knew it)* (1996), was recently named a "Classic in Human Geography" by the journal *Progress in Human Geography*.

Julie's ideas and energy live on and grow even without her physical presence. In the department, Julie's graduate students have continued their work on diverse economies, working with Eve Vogel or Dick Wilkie in the department, as well as Kath Gibson, Julie's longtime collaborator, through regular video conferences from Australia. Graduate students continue to meet monthly to listen, critique and collaborate on their writing and thinking; and a wider network continues to explore and develop the theory and practice of community economies (see www.communityeconomies.org). At the time of her death Julie was working on a popular book with Kath, **Jenny Cameron** and department alumnus **Stephen Healy** called *Take Back the Economy, Any Time, Any Place*. This book will be published by the



University of Minnesota Press in 2012 and will be dedicated to her memory.

Please see the department's full essay about Julie's life and contribution, written shortly after her death, at: www.geo.umass.edu/Julie%20Graham%20remembered.pdf and an amazing list of messages in memory, celebration, and admiration of Julie Graham at: <http://forjuliegraham.wordpress.com/2010/04/04/the-saddest-news>

NEW JOSEPH HARTSHORN QUATERNARY LABORATORY

By Julie Brigham-Grette and Ray Bradley

August 2011 will mark completion of the wholly remodeled Quaternary Laboratory. (photo, see p. 19) Housed in Room 231 where many alums may have once taken courses in mineralogy, the new facility is being outfitted with modern cabinetry, sinks, and workspaces with plenty of room for core processing and subsampling. In our new space, pictures of Joe will adorn the walls along side framed copies of a few of his outstanding surficial map publications.

Besides a new CoreWall Station, the room will be equipped with a state-of-the-art Geotek core splitter, and Geotek Multi-sensor core logger (for high resolution photography, color scanning, magnetic susceptibility and gamma density). Also part of the new laboratory equipment inventory will be a Cox Analytical Systems Itrax XRF core scanner to produce optical RGB and micro-x-radiographic images, and magnetic susceptibility, as well as heavy and light elemental profiles in high resolution from centimeter to submillimeter scales. This instrument can be

used to scan marine and lake cores, corals and even wood and speleothems for paleoclimate and other research interests. The Itrax scanner will be housed in the XRF laboratory.

The new facility will place UMass Amherst as one of the best-equipped Quaternary labs in the country. With a new cold room downstairs capable of holding 1km of split core, we anticipate hosting visitors from throughout New England but especially from the Five College region. Generous funding for the laboratory renovation and equipment comes from NSF, NOAA and the UMass College of Natural Sciences.

At the request of Joe Hartshorn's family, our department is privileged to host the Joseph H. Hartshorn Memorial Fund in his honor. We hope that many of you will be willing to contribute so that his legacy may continue to enrich the academic endeavors of students within the Geosciences. Contributions can be sent to the **Joseph H. Hartshorn Memorial Fund**, Department of Geosciences, University of Massachusetts, Amherst, MA 01003.

NEW FACULTY MICHAEL RAWLINS

MANAGER OF THE CLIMATE SYSTEM RESEARCH CENTER

Michael Rawlins joined the department in spring 2010. Michael is a hydroclimatologist who is interested in understanding aspects of regional and continental scale hydrology and climate change. He is the manager of the **Climate System Research Center**, currently housed in Hasbrouck Hall, across the street from Morrill Science Center. Michael earned his PhD from the University of New Hampshire in 2006. Following graduation Michael was a postdoc at the Jet Propulsion Laboratory in Pasadena, California and a visiting assistant professor at Dartmouth College. Recently he led a multi-investigator synthesis study which capped a five-year effort known as the Freshwater Integration study (FWI), funded by the National Science Foundation, which sought to answer fundamental questions about the Arctic's fresh-



water cycle. The capstone paper appeared in the Journal of Climate in November 2010. Michael is the principal investigator of a new NASA-funded project which will examine how changes in Arctic permafrost and surface hydrology might influence greenhouse gas cycling from northern lands. This work will center on the application of numerical models and remote sensing data to characterize sources and sinks of carbon dioxide and methane from thawing permafrost, wetlands and lakes, and forest/tundra ecosystems. Closer to home, Michael has begun research with **Ray Bradley** to assess recent and potential future changes in the climate of the Northeast US, using high-resolution regional climate models and observational data sets, with an eye toward the region's ecosystems and water resources.

DAVID FINKELSTEIN

MANAGER OF THE STABLE ISOTOPE AND BIOGEOCHEMISTRY LABS

David Finkelstein rejoined the department in Fall 2011 after departing as a student 20 years earlier, to return as the manager of the Stable Isotope and Biogeochemistry laboratories. Is it true that a former student can have more gray hair than his adviser? What is old is new again, just with a tie dyed lab coat, more grays than black curly hair, a knack for ignoring circadian rhythm and playing loud music in the lab. Dave is a confused limnogeologist interested in understanding the biogeo-, organic- and stable isotope geochemistry of modern and deep time lake systems, the transfer of climate signals to the organic geochemical/sedimentological record and the degradation of organic matter and oil in terrestrial systems. He earned his PhD from the University of Illinois in 1997 focusing on clay and zeolite mineralogy/diagenesis in an Oligocene lake deposit, and briefly taught at Illinois and Miami of Ohio. Following his first dip into teaching (without ever being too far from the Illinois Basin) he headed to Indiana University to immerse himself in an extended six year postdoc into hot topics such as the biogeochemistry of evaporative lacustrine systems



and the organic chemistry of fire! There he discovered his burning desire to balance field and lab work, and immerse himself in the secret art of keeping instruments happy... let them listen to alternative music! After spending four years as an Assistant Professor at the University of Tennessee and completing two PhD students, Dave could not resist the magnetic pull north (home!) to rejoin the Department and step foot again on Jurassic lacustrine rocks. Whether it is teaching the students how to use the instruments or extracting organic goo and interpreting data, feeding the Kiel carbonate samples or staring down/tweaking the finicky Delta V, science is guided under the auditory control of Neko Case, Calexico or WEQX. What could be better? Dave and colleagues from Indiana and Tulane Universities are funded through NSF to document organic geochemical and isotopic changes of landed petroleum over time following the April 20, 2010 Gulf of Mexico oil spill. Here in the Department, Dave is teaming up with Mark Leckie once again to look at Cretaceous marine deposits but now with an even larger analytical tool kit!

COMING SOON: ISLA CASTAÑEDA AND CHRISTINE HATCH

By Mark Leckie

Faculty hiring is very competitive on campus these days, but last year we had two great opportunities to add to our faculty ranks in the department, which culminated in two very successful searches. **Steve Petsch** chaired a search for a tenure-track Assistant Professor in Geobiology-Global Change. Following a successful request for proposals, Geosciences was one of only six departments selected for a faculty position affiliated with the UMass Commonwealth Honors College (CHC). This hire represents a wonderful opportunity to add to our strong geochemistry and climate groups in the department. **Isla Castañeda** fits the bill to a 'tee'. She earned a PhD at the University of Minne-

sota, and has been a postdoctoral investigator in one of the very best biogeochemistry labs in the world at the Royal Netherlands Institute for Sea Research (NIOZ) since 2007. Her research focuses on using organic geochemical and isotopic proxies to reconstruct records of environmental change preserved in marine and lacustrine sediment archives. As a biogeochemist, she has expertise in multiple biomarker proxies used in paleoclimatic research, including applications and proxy development, as well as modeling. Isla's appointment will be in the Department of Geosciences, with affiliation as Honors Faculty in the CHC.

In collaboration with our friends in the Department of En-

NEW FACULTY, CONT'D.

vironmental Conservation and UMass Extension (Natural Resources and Environmental Conservation program), we were offered the opportunity to add an Extension faculty member to the Department. **David Boutt** chaired the search for a non-tenure track Assistant Professor interested in areas of water and climate change. **Christine Hatch** is no stranger to the area having graduated from Amherst College in 1998. She gained applied experience while working for the USGS and environmental consulting firms before going on for a PhD at the University of California, Santa Cruz; she is currently a Postdoctoral Researcher at the University of Nevada-Reno in the Department

of Geological Sciences and Engineering. Christine has expertise in hydrogeology, ground-water surface-water interactions, and distributed temperature-sensing technologies. As a faculty member with the UMass Extension Program, her research, outreach, and teaching will focus on Massachusetts water resources and regional climate change. We anticipate great synergies between Christine and Dave Boutt's hydrogeology program, faculty and students associated with the Climate System Research Center, and the Massachusetts Geological Survey. We are very pleased that both Isla and Christine will be joining the Department in August, 2011.

A BIRTHDAY TRIBUTE

By Laurie Brown

Our department is blessed with a number of active and productive emeriti, many of whom still roam the halls of Morrill. It recently came to our attention that a number of these folks were steadily approaching the big eight-oh mark, and within the next year or so would celebrate 8 decades of living. A wonderful birthday luncheon was planned and executed earlier this year by **Eileen McGowan** (PhD, 2010) and **Don Sluter** (current grad) for the octogenarians **John Hubert**, **George McGill**, **Tony Morse**, and **Don Wise**; missing from this group due to his defection "across the pond" to Norway was **Peter Robinson**. At the lunch, the stalwart group was toasted by faculty, students and friends (words by **Laurie Brown**):

"Three hundred and twenty years of living,
 Two hundred and forty years of geologizing,
 Over a century and a half of service to this department,
 From the Connecticut Valley to the anorthosites of Nain,
 From Canyonlands to the Outrageous Hypothesis for the Rockies,
 From the Moon to Mars to Venus and beyond,
 These four have 'been there, done that'!
 But, more importantly, are STILL here and STILL 'doing it'
 For the great geology, the wonderful camaraderie, and
 For building this department into the place we all know and love,
 We salute you!"



L - R: George McGill, Don Sluter, Tony Morse, Eileen McGowan, John Hubert, Don Wise, and Laurie Brown.

ENVIRONMENTAL SCIENCE AFFILIATES WITH THE GEOSCIENCES DEPARTMENT

By Richard Yuretich

UMass Amherst has a long-standing undergraduate major in Environmental Science that has involved students and faculty in Geosciences only peripherally. Although we always felt that we are part and parcel of environmental science taken broadly, our active participation was hindered by curricular differences between the former colleges of Natural Science and Mathematics, where Geosciences was located, and Natural Resource and the Environment, which was headquarters for the Environmental Science major. The formation of the College of Natural Sciences on the campus in 2009 has now brought us together with other environmentally-oriented academic departments, and we are creating a new management structure and curriculum to align the Environmental Science major with the new reality. Specifically, Environmental Science will become an interdisciplinary major shared by the Departments of Geosciences, Environmental Conservation, and Plant, Soil, & Insect Sciences. **Richard Yuretich** is Co-Director of the program, along with Professor **Curt Griffin** of Environmental Conservation, and the Department Heads of the three collaborating departments comprise the remainder of the Executive Committee. The Environmental Science major currently has a very strong emphasis on biology and chemistry. The proposed curriculum revision will add courses in Geosciences and include a significant applied and field component in the requirements. There are currently 250 majors in Environmental Science and it is still growing; we expect our active presence in this undergraduate program to increase the visibility of Geosciences in the student population and to augment interest in our mainline majors of Geology, Geography, and Earth Systems.

GEOGRAPHY PROGRAM LAUNCHES ENVIRONMENTAL GEOGRAPHY CONCENTRATION

By Stan Stevens

In Fall 2011 the Geography program will begin offering a concentration in Environmental Geography with the Geography BA degree. The new concentration offers UMass students an integrative social science approach to environmental studies, which emphasizes human geography perspectives on environmental issues, policy, and history. It will feature foundation courses on world environmental issues, the human landscape, and global environmental change; a set of core advanced environmental studies courses including courses in political ecology, conservation, environmental policy, urban environmental history, and water conflict and sustainability; training in geographic methods; and opportunities for independent study and for elective studies across campus.

GEOGRAPHY GRADUATES: WHERE ARE THEY NOW?

By Piper Gaubatz

Are you wondering what ever happened to your geography classmates? Undergraduate students in Geosciences 314 - Writing in Geography this year decided to analyze data on UMass B.A./B.S. Geography graduates for their group project. They mapped alumni data for graduates from 1970-2010 in terms of place of residence, occupation and gender. You can find their analysis and more information on the geography program at:

<http://blogs.umass.edu/umgeog/undergraduate-programs/geography-graduates-where-are-they-now/>

THE TRAIL OF TIME AT GRAND CANYON A NEW OUTREACH EXHIBITION WITH A UMASS TOUCH...

By Mike Williams

The Grand Canyon has a new outreach exhibition called the "Trail of Time". It is the brainchild of **Karl Karlstrom**, University of New Mexico and **Mike Williams**, UMass-Amherst. The idea came about in 1995, at a time when there was very little on display about the geology of the canyon or the rocks it exposes. People could visit the canyon and learn about the Kaibab squirrel and the difference in the ecology of the north and south rims, but very little about the breathtaking canyon or the view into Earth's past. As the idea matured, Karlstrom and Williams were joined by **Laura Crossey** and **Ryan Crow** (UNM), **Steve Semken** (Arizona State), **Judy Bryan**, (National Park Service), and for the past fifteen years they have worked to implement a new type of geologic outreach display.

The Trail of Time is a fully accessible interpretive walking

timeline trail along the south rim of the Grand Canyon between the Yavapai Geology Museum and Grand Canyon Village. It is



Mike Williams helping cut the ribbon at the opening ceremony for the Trail of Time.

the world's largest geoscience exhibition at the world's grandest geologic landscape. The main goal is to utilize the unique vistas and rocks at Grand Canyon to help visitors ponder, explore, and understand the magnitude of geologic time and the stories written in Grand Canyon rocks and landscapes. The 4.56-km long Trail of Time is marked every meter, with 1 meter = 1 million years of Earth history. Viewing tubes and interpretive materials help visitors connect the rocks visible in Grand Canyon to their place along the timeline. The Trail of Time is part of a research program aimed at understanding and helping improve public cognition of geologic time - the vital connection between human time scales and the million year heartbeat of the Earth.

TRAIL OF TIME, CONT'D.

An adjoining "Million Years Trail" provides walkers with a way to experience the transition between human time scales, with markers for individual years, centuries, major events in human history, and geologic time. Tens of new display panels, telescopes, and a new walking guide have been installed to help visitors relate the timeline trail to Earth history at all time scales.

One of the most popular components of the Trail of Time are 47 large rock samples, many the size of a table or chair, that were rafted, flown, or carried from the canyon and placed at their proper time (age) along the trail. The trail also has four portals at the four main entry points. These are 7' tall rock sculptures showing the stratigraphy of the Canyon, from the Vishnu Schist to the Kaibab Limestone, constructed rock-for-rock with the actual formations from the canyon (see figure at left). People seem to love touching and inspecting all of the rocks, and many people have been seen first looking at a rock sample and then moving to the display panels to learn more. That was the goal all along.



One of four portals located at the entry points of the Trail, showing the stratigraphy of the canyon.

The Trail of Time was officially opened in October, 2010. Representatives from the federal government, the Park Service, universities, and education outreach organizations were on hand for the ceremonies and for a three-day workshop entitled: "New Approaches to Geoscience Education in the National Park System".

The project, headed by Karlstrom, Williams, Crossey and Semken, was funded by a grant from the **Informal Science Education Program of the National Science Foundation** with significant financial and in-kind support from **Judy Bryan** and the **National Park Service**. **John Sweeney** from UMass Geosciences joined the team later in the project and helped with the design and construction of markers, telescopes and displays.



The Trail of Time runs along the south rim of the Grand Canyon, the world's largest geoscience exhibition at the world's grandest geologic landscape.



NEWS FROM LAKE EL'GYGYTGYN, SVALBARD AND THE BERING AND CHUKCHI SEAS

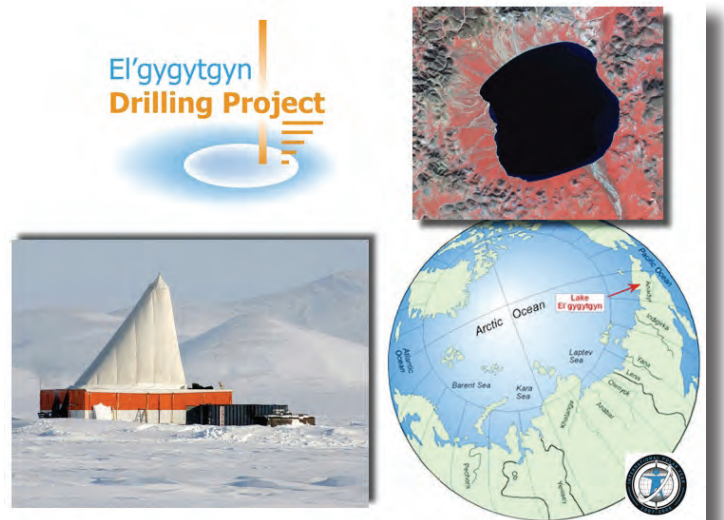
By Julie Brigham-Grette

Scientific Drilling at **Lake El'gygytyn**, NE Russia: Successful deep drilling at Lake El'gygytyn in Spring 2009 (67° 30' N, 172° 05' E), in the center of western Beringia, recovered 315 meters of sediment representing the longest time-continuous sediment record of past climate change in the terrestrial Arctic. The core was taken using the DOSECC GLAD800 (Global Lake Drilling 800m) hydraulic/rotary system engineered for extreme weather using artificially thickened lake ice as a drilling platform. El'gygytyn is a Yupik name with various translations as "the white lake" or "the lake that never thaws". Today the lake maintains an ice cover 9-10 months per year.

Besides Brigham-Grette (US co-chief), this has been an international program from the beginning with co-chiefs Martin Melles (Univ Köln), Pavel Minyuk (NEISRI-Magadan) and Christian Koeberl (Univ of Vienna). The project at UMass involves faculty members **Burns, Deconto, Brown, Petsch** and **Finkelstein**. PhD candidates **Kenna Wilkie** (biomarkers and deuterium isotopes), Kate Murdock (rock magnetism) and **Sebastian Koenig** (climate modeling) as well as MS student **Addie Holland** (carbon/nitrogen isotopes) have been busy on the project. Post-Doc **Tim Cook** has been instrumental to understanding the sedimentology. Funding was largely provided by the ICDP, US NSF, the German BMBF, and the Russian Academy of Sciences Far East Branch.

Commonly referenced as orbital forcing of climate change,

rhythmic changes in both shape and orientation of Earth's orbit around the Sun have greatly modified our climate. Before about 900,000 years ago, natural climate cycles pulsed between cold glacial and warm interglacial periods every 41,000 years (or



41kyrs); after that, climate cycles seem to be driven by longer 100 kyrs cycles. Because Lake El'gygytyn was formed 3.6 million years ago (Ma) by a meteorite impact event, this unique lake provides a means of capturing the terrestrial dynamics of



glacial/interglacial and millennial-scale change from this high latitude region over the duration of the “41 kyr world” and late Cenozoic “100 kyr world”. The results of analyses from these cores are being used to understand the history and pace of Arctic change and are being integrated into a network of sites collected by the geological community from the Arctic Ocean to Antarctica (especially ANDRILL, the Antarctic Drilling Program).

Lake El’gygytyn has been accumulating sediments since the warmest part of the middle Pliocene (3-5 Ma) when large parts of the Arctic borderlands were forested and the existence of a Greenland ice sheet is debated. Paleomagnetic reversal stratigraphy forms the basis for our geochronology. The Pliocene portion of the lake record (from 3.6 to 2.6 Ma) extends from 123 m to 315 m depth below lake floor with five times the sedimentation rate of Quaternary interval (2.6 Ma to today), presumably

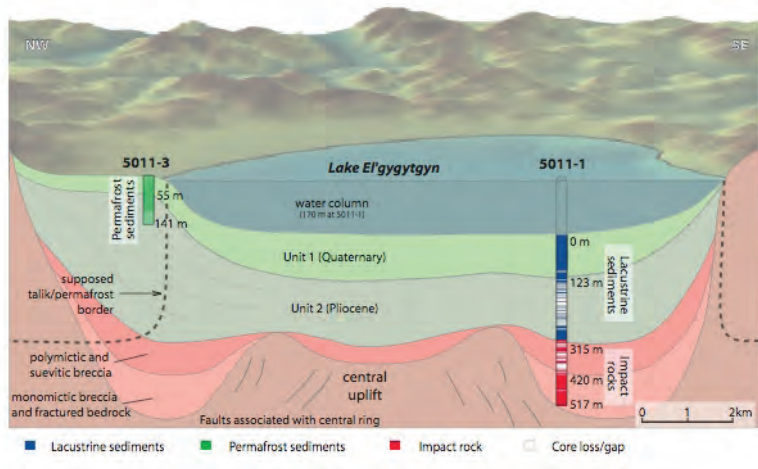


Figure 1. Schematic cross-section of Lake El’gygytyn geology, an ancient meteorite crater lake. A continuous climate record was recovered from a drill core at site 5011-1 in lacustrine sediments to 315 m depth (blue colors). Meteorite impact rocks (including polymictic and suevitic breccia and fractured bedrock) were also drilled below (red colors) to a depth of 517 m. Core 5011-3 was drilled on land next to the lake to a depth of 141 m for studies of sedimentology and permafrost. Permafrost (or frozen ground) extends hundreds of meters outside of the talik (thawed zone) beneath the lake. (Figure from March 2011 issue of Scientific Drilling).

due to enhanced hydrologic systematics (i.e., warmer and wetter). Fossil pollen studies of this portion of the core show that the landscape around the lake was then largely dominated by tree pollen, providing a compositional idea of changes in Pliocene high latitude forests of pine (*Pinus*), larch (*Larix*) spruce (*Picea*), fir (*Abies*), alder (*Alnus*), and hemlock (*Tsuga*), not just shrubs. The Quaternary section is roughly 123 meters long. It includes a complete record of glacial/interglacial change including warm intervals correlative with well known marine isotopic stages 5e, 9, 11 and 31 which each differ in character, presumably due to orbital forcing and feed backs. Because many of these warm episodes at Lake El’gygytyn surpass the warmth of the last interglacial (~125kyrs) when the Greenland Ice sheet is thought to have been smaller than today, we expect these new data will

contribute to new modeling efforts to test for the vulnerability of Arctic sea ice and the Greenland ice sheet to global warming.

Svalbard REU Program in Ny Alesund: Brigham-Grette has been collaborating with a consortium of faculty including **Ross Powell** (NIU), Al Werner (Mt. Holyoke), and UMass Alums **Steve Roof** (Hampshire College) and **Mike Retelle** (Bates College) in running an undergraduate research program on Svalbard. The REU (Research Experience for Undergraduates) program was established by the National Science Foundation to encourage and fund student research opportunities in a wide variety of fields. Students selected from around the country work on individual projects and in close conjunction with both faculty advisors and other student researchers. This Svalbard REU program focuses on understanding how high latitude glaciers, melt-water streams, and sedimentation in lakes and fjords respond to changing climate. Since summer of 2004, six undergraduate students have been selected to participate in the summer field program. The students formulate their own research questions, develop their project, and complete their field research during a five-week program in Svalbard, Norway. Following the summer program, students complete their projects at their home institution during the following academic year as a senior thesis. Julie and Ross take the next group of students to Ny Alesund this summer 2011 to conduct contemporary studies of tidewater glacier margins in Kongsfjord, Svalbard (79°N). Alum **Luke Trusel** (BS 2006), an REU participant recently published a paper from his 2005 field experience, completed a MS with Ross Powell and is now a PhD candidate at Clark University in polar studies.

Sea Ice proxy Development of the Bering and Chukchi Seas: Sea ice extent in the Arctic Ocean and its marginal seas is a key component of the coupled ice-atmosphere-ocean system and a driver of meridional ocean circulation, yet information about sea ice conditions in the past is very limited. New funding arrived this year for **Brigham-Grette, Petsch** and **Finkelstein** to conduct research aimed at using surface sediments collected from the Bering and Chukchi Seas to develop quantitative measures of seasonal sea ice extent and duration. The project supports PhD candidate **Beth Caissie**’s award winning work using diatom assemblages and diatom morphology but also builds on the work of alum **Cecily Sharko** (MS 2009) who analyzed a subset of Beth’s collections for the biomarker IP25, derived from ice-associated diatoms. PhD Candidate **Jim Kocis** just joined the program and is following up on Cecily’s work. The future goal of the research is to apply sea ice reconstructions using our calibrated diatom assemblage methods and IP25 analysis to a suite of marine cores that form a latitudinal transect through the Bering and Chukchi Seas. They hope to then provide quantitative reconstructions of Late Pleistocene and Holocene seasonal sea ice extent at centennial-scale resolution, corroborated with independent biomarker-based evaluation of surface water temperatures (via alkenones and GDGTs).

THE FUTURE OF OCEAN DRILLING: THE INTERNATIONAL OCEAN DISCOVERY PROGRAM (IODP)

By Rob DeConto

In 2010, an international team of 12 scientists were chosen from an extensive list of nominees to develop the future science plan for the Integrated Ocean Drilling Program (IODP). **Rob DeConto** was among those 12 authors of the new science plan, who over the course of ~10 months developed a focused 100-page strategic document outlining the key science objectives and operational plan for scientific ocean drilling from 2013-2023. The new ~2-billion dollar International Ocean Discovery Program (IODP) outlined in the document *Illuminating Earth Through Subseafloor Sampling, Observation, and Experimentation* focuses on four key areas: 1) Climate and Ocean Change: Reading the Past, Informing the Future, 2) Biosphere Frontiers: Deep Life and Environmental Forcing of Evolution, 3) Earth Connections: Deep Processes and Their Impact on Earth's Surface Environment, and 4) Earth in Motion: Processes and Hazards on Human Time Scales. Rob's involvement was focused on the climate chapter, and more specifically, how deep-sea scientific drilling can address issues pertaining to 1) the response of Earth's climate system to elevated levels of atmospheric CO₂, 2) how resilient the climate system is to chemical perturbations to the ocean, 3) how ice sheets, and therefore sea level, will respond to a warming climate, and 4) what controls regional patterns of precipitation, such as those associated with monsoons or El Niño. Rob enjoyed the experience and was honored to be chosen for such an important task. He also felt lucky to be able to draw on his experience working on other major international collaborative research programs such as ANDRILL and ACE (Antarctic Climate Evolution).

The current IODP began in 2003 and succeeded the Ocean Drilling Program (ODP; 1984-2003) and the Deep Sea



The JOIDES Resolution.

Drilling Project (DSDP; 1968-1983). A number of UMass faculty (**Dave Boutt, Steve Burns, Mark Leckie, Mike Rhodes**) and alumni (**Wendy Audio, Beth Caissie, Steve Carey, Bill Chaisson, Brooke Olson Carson, Steve Nathan, Joel Sparks**) have sailed aboard the *Chikyū*, the *JOIDES Resolution* and/or *Glomar Challenger*, or worked closely with scientific ocean drilling.

MORRILL DAY

By Mark Leckie

The books and other resources housed in the Morrill Library were moved out years ago. The space was occupied by the Nursing program for a couple of years while Skinner Hall was being completely renovated. We were very hopeful that some of that space would come back to us. It wasn't to be. This large L-shaped space now houses a new 92-seat University classroom, the College of Natural Sciences Advising Center, a student lounge and coffee shop, and the Biology Advising offices. During Fall 2010, departments of Geosciences and Biology, in collaboration with the CNS Advising Center organized a "Morrill Day" to celebrate the upgrades in the space. We set out to spruce up the entrance to Morrill Science Center (MSC), which serves as the gateway to our two departments. New signage was installed; we sponsored a photo contest for select color photographs to be mounted in the corridors and foyer. We held a contest to name the coffee shop;



Tony Morse had the winning name: "The Life and Earth Café." Rob DeConto's wife **Sandy Litchfield** had her undergraduate graphic art class paint a "life and Earth mural" in the stairwell leading from the Morrill entrance and foyer up to the second floor where the library used to be. We renovated the entry displays to Morrill Science Center; the space had been in miserable disrepair for decades (see photo to left)! There are plans to place planters and seating outside on the concrete patio at the main entrance to MSC along North Pleasant Street. The new Climate System Research Center and the new Geosciences classroom next to Morrill Auditorium on the first floor will soon be part of this overall renovated space at the main entrance to Morrill Science Center. Slowly but surely over the decades our space in MSC has been upgraded; we remain hopeful that additional space will become available to us in MSC when the New Laboratory Science Building opens next year.

NEWS FROM AROUND THE DEPARTMENT

Here's some other people news from around the Department (Department Head bragging rights):

Rob DeConto was promoted to Full Professor; Rob also served on the Science Plan Writing Committee for renewal of the \$2B Integrated Ocean Drilling Program for 2013-2023.

David Boutt was promoted to Associate Professor with tenure; Dave was also selected for a Lilly Teaching Fellowship for the 2011-2012 academic year.

Julie Brigham-Grette was awarded a Conti Research Fellowship for 2011-2012; this distinguished University award recognizes outstanding accomplishment and potential for continued excellence in research and scholarly or creative activity.

Michele Cooke received a Distinguished Outreach Teaching Award in 2010 for her outreach efforts over the past 6 years, which focused on bringing authentic geologic activities and experiences to deaf and hearing-impaired K-12 students in the field and in the lab.

Mike Williams was selected as a University Distinguished Faculty Lecturer and received the Chancellor's Medal at his October 2010 talk entitled: "Telling Earth Time: New Ways to Date Earth Processes and Explain Geologic Time".

Qian Yu was awarded an Early Career Best Paper Award, Remote Sensing Specialty Group of the Association of American Geographers in 2010.

In the past two years, **Michele Cooke**, **Mark Leckie**, **Sheila Seaman**, and **Mike Williams** were elected as Fellows of the Geological Society of America.

Beth Caissie (PhD candidate in Geosciences) was awarded the American Quaternary Association's biennial Denise Gaudreau Award for Excellence in Quaternary Studies in 2010 for her sea ice proxy research.

Brian Yellen (MS candidate in Geology) won a UMass Distinguished Teaching Award in 2010 for his excellence as an instructor in GeoSci 101 lab. Joe Hartshorn and Mike Williams are previous departmental DTA recipients.

Sebastian Koenig (PhD candidate) received an Isenberg Fellowship for 2010-2011.

Ethan Miller won a "Hannah Arendt International Postgraduate Research Scholarship" at the Centre for Citizenship and Public Policy, University of Western Sydney - to study for PhD with Kath Gibson, Julie Graham's longtime collaborator.

David Finkelstein (BS'1987; MS'1990) is the new Manager of the Stable Isotope and Biogeochemistry laboratories. We are very pleased to welcome back this Geosciences alum who brings extensive research experience and expertise to the Department. He has already made a huge impact on the throughput, organization, and efficiency of the two labs.

Carol Vogel retired from the Front Office in 2008 after 30 years at UMass. We have two great additions to the Front Office: **Jenn Nikonczyk** has replaced Carol, and **Laura Bishop** works half-time assisting with travel and other grant-related tasks. **Marsha Howe**, **Nicole Pietraszkiwicz**, and **Lorna Stinchfield** are the core of our Front Office staff. **John Sweeney** is the back and muscle (literally) for the fix- and build-it tasks around the Department; his creative problem solving has come to the rescue of many a faculty member while saving the Department oodles of dollars. **George Drake** maintains the network in Morrill Science Center, with additional support from **Tom Carpenter** and **Chris Hoogendyk**. We are thankful to

have such a friendly and helpful support staff.

Mike Rhodes and **Steve Mabee** (State Geologist) have funding from the Department of Energy (DOE), through a \$23 million award to the Association of American State Geologists (AASG) to document the geothermal energy resources in each State. The project is administered by the Arizona State Geological Survey headed by alum **Lee Alison**. Massachusetts, of course, doesn't have much geothermal data and the conventional wisdom is that Massachusetts and New England don't have any significant geothermal resources. Where are the volcanoes, hot springs or regions of high heat flow? Steve and Mike think otherwise. They are on a quixotic quest to show that there is geothermal energy lurking deep within New England's many granites. This is because the radioactive decay of potassium, uranium and thorium, which are high in granites, produces heat. Some granites could be over 150° C at depths of 4 to 6 km; sufficient to produce electricity and provide hot water for space heating. Not all granites are created equal. Some are hotter than others. The best scenario is when hot granite is overlain by a thick blanket of insulating sediments, such as in our Connecticut River Valley or the Narragansett Basin. The first task of the project is to sample all the granites of Massachusetts and Connecticut, measure their heat producing elements in Mike's XRF laboratory, and to create maps identifying granites that are potentially hotter than others. In following years we will concentrate on detailed studies of selected hot granites with an idea to identifying potential drilling targets. As Steve says "when the State or a company asks where to drill, we want to be in a position to tell them".

Carrie Petrik, Master's student working with **Steve Mabee**, **Dave Finklestein** and **Sheila Seaman** on carbon sequestration potential in Connecticut Valley basalts, has had a busy summer. In June, she attended the Research Experience in Carbon Sequestration summer program in Birmingham, Alabama for 10 days. The program is sponsored by DOE in collaboration with Southern Company, EnTech Strategies and SECARB-ED. Students are selected through a competitive process. In July, she also attended the International Energy Agency Greenhouse Gas (IEAGHG) International summer school hosted by the Illinois Geological Survey to learn about carbon capture and sequestration (CCS) in deep saline aquifers. Selection for this program is also a competitive process. At IEAGHG she was selected as the most outstanding student and was chosen to attend next summer's IEAGHG international summer program in Beijing, China as a student mentor, all expenses paid. In addition, she was invited to give a poster on her work at the next IEAGHG conference to be held in Kyoto, Japan in early fall 2012, all expenses paid. Finally, she was invited by the education arm of SECARB to present a summary on the geology of CCS as part of a training program for a group of international students at the World Bank in Washington, DC in early September, 2011.

News from **Dick Wilkie**: **Bandana Purkayastha** finished her Master's in Geography with Richard Wilkie in 1987 - our 14th Master's student. Her thesis was entitled, "A Sense of Place in the Act of Immigration." She went on to the PhD program in Sociology at the University of Connecticut (**Jane Wilkie's** Department). Not only did she finish there, she was hired with a joint appointment with Asian Studies and Sociology.

NEWS FROM AROUND THE DEPARTMENT

Bandana has since risen to Full Professor, and was named Acting Department Head of Sociology (a 28 member department) beginning in September 2011. In addition, Bandana received the prestigious **University of Connecticut Faculty Excellence in Graduate Teaching Award** for 2010, an honor that goes to only one faculty member a year.

Chris Condit is riding his bike into work most days, and flying his 1952 Cessna 170B whenever an excuse happens to do that. He had fun late last summer, participating in the **NASA DRATS** exercise for two weeks around and north of Flagstaff, helping a NASA team of ~120 people train astronaut-geologists as they simulated lunar and Martian traverses in two SUV sized rovers. The crews lived for 6 days in the rovers before changing teams and covering similar traverses in reverse.

Read about it here: http://news.bostonherald.com/news/regional/view/20100906umass_geologist_helping_prepare_for_mars_missions/

And on a more humorous note, a companion article: http://bostonist.com/2010/09/07/umass_amherst_geologist_space_is_co.php

WFCR (our local National Public Radio affiliate) posted this interview:

AMHERST, MA (WFCR) - They're astronauts and geologists traversing the Arizona desert on a NASA mission known as "desert research and technology studies," using the high plateaus to simulate an alien planet, training for research in space. UMass geologist Christopher Condit has been in the desert for 2 weeks, helping astronauts identify formations. WFCR's Jill Kaufman discovered they start with a satellite map and rover, "land" in a spot and travel as if on a lunar mission, stopping to gather specimens. (c) Copyright 2010:

http://ddm.geo.umass.edu/ASTRONAUTS_DELIGHT_FEATURE.mp3

Amherst Bulletin, not to be outdone, also published a bit on his work in Flagstaff - see URLs:

<http://ddm.geo.umass.edu/AmherstBulletinA1-2011-04-22.pdf> and

<http://ddm.geo.umass.edu/AmherstBulletinA8-2011-04-22.pdf>

Chris went out to Mountain View, California for the **Google Earth Penrose conference** in January. He also received a second summer's funding from the USGS EDMAP program, so his (swan song?) MS student, her field assistant and Chris will be out finishing up the mapping in the south central part of the Springerville volcanic field in east-central Arizona. Last summer it was a real treat for him to be mapping basalt flow edges up at 8400 feet on the northern part of the White Mountain Apache reservation, chasing elk around the open parks and the ponderosa pine-spruce forests in one of his favorite parts of the world.

Ray Bradley sends some news from the **Climate System Research Center: Michael Rawlins** joined the Climate Center as manager in April 2010. Michael received his PhD from the University of New Hampshire in 2006. His research focuses on regional climate and hydrology using numerical modeling. Michael's experience in Arctic climate builds on existing strengths in the Center and Department of Geosciences.

Alan Condon, who in 2003 obtained an MS degree in the Department working with **Rob DeConto**, has returned as a post-doc, after obtaining his PhD at the University of Sheffield

(UK) and post-doc research at MIT and Woods Hole Oceanographic Institution, and the University of Alaska. His research on numerical modeling of ocean circulation led to a recent publication in Geophysical Research Letters on meltwater discharged from glacial Lake Agassiz that challenges conceptual ideas of possible triggers for abrupt climate change.

Billy D'Andrea, an NSF postdoctoral fellow, has accepted a position at Lamont-Doherty Earth Observatory, Columbia University in New York beginning Fall 2011.

Nicholas Balascio defended his PhD dissertation in Fall 2010 and will remain at the Center as a post-doc. He recently published a pair of papers on basin stratigraphy and on tephrochronology from the Lofoten Islands, Norway. The papers appeared in the journal Quaternary Research and the Journal of Archaeological Science.

Kinuyo Kanamaru defended her PhD dissertation in Fall 2010 and will remain at the Center as a post-doc, working with **Jon Woodruff** on sedimentary records of former tropical storms and tsunamis in coastal Japan.

Addie Holland defended her Masters thesis in Fall 2010. She remains at the Climate Center and has assumed responsibilities for organizing and hosting a seminar series focused on climate change and associated policies relevant to the Northeast US. Addie has developed a new web site focused on climate and climatic change in New England; see: www.neclimate.info

Kaitlyn Weider defended her Masters thesis in Fall 2010. She and David Boutt published their research on water table response to the last 60 years of climate in New England in Geophysical Research Letters. Kaitlyn is now a Project Hydrogeologist with HRP Associates in Farmington, CT.

Xiaohui Huang defended her Masters thesis in spring 2011, and will return to China to pursue her career there.

PhD candidate **Sebastian Koenig** and his advisor **Rob DeConto** published a study, using a coupled GCM - ice sheet model, to quantify thresholds for glaciation on ice-free Greenland. The article appeared in the journal Climate Dynamics. They concluded that ice sheet growth on Greenland is highly dependent on orbital forcing, internal feedbacks (such as vegetation) and background CO2 levels.

In May 2010, **Doug Hardy** and colleague **Carsten Braun** conducted fieldwork at their automated weather station (AWS) on Quelccaya Ice Cap in Peru. A highlight of the field effort was their discovery of a weather station melting out of the ice that had been installed on the glacier in June 1978 and buried just a few months later.

Mark Besonen has left the Center, where he was a post-doc, and is now an Assistant Professor at Texas A & M University, Corpus Christi, Texas.

Ambarish Karmalkar has left the Center, where he was a post-doc, and is now a postdoctoral Researcher at the School of Geography and the Environment, University of Oxford, Oxford, United Kingdom.

Lucien von Gunten has left the Center, where he was a post-doc, and is now a Post-doctoral Research Associate at the Geological Institute, Climate Geology, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland.

Ray Bradley was appointed to the Scientific Committee of the International Geosphere Biosphere Programme, with

CONGRATULATIONS TO THE 2010 AND 2011 STUDENT AWARD WINNERS!

OUTSTANDING SENIOR AWARDS

Geology: 2010: Adam Brown 2011: Heather DeRoy, Claire Pless, and Marissa Jenko

Geography: 2010: Jessica Brooks 2011: Christopher Braun

Earth Systems: 2010: David Vaillencourt 2011: Shakib Ahmed

OUTSTANDING TEACHING ASSISTANT AWARDS

Geology: 2010: Andrew Fraass and Justin Herbert 2011: Brian Yellen

Geography: 2010: John Legrid 2011: Weining Zhu

MEMORIAL AWARDS

H.T.U. Smith Award:

2010: Sharon Adams, James MacAllister, Claire Pless, Rachel Weiss, and Weining Zhu

2011: Marissa Mnich, James MacAllister, Mingma Norbu Sherpa, and Samuel Davin

Elinor Fierman Award: 2010: Lisa Kanner 2011: Marissa Mnich and Sean Regan

Gloria Radke Award:

2010: Christine Brandon, Serena Dameron, Lisa Kanner, Sebastian Koenig, Brian Yellen and Weining Zhu

2011: Christine Brandon, Evan Earnest, Colleen Kelley and Changjiang Ye

Leo M. Hall Award: 2010: Liam Bevan, Sam Davin, Xiaohui Huang, Kara Jacobacci, Sebastian Koenig, Cordelia Sand, Melishia Santiago and Brian Yellen

2011: Justin Herbert, Evan Earnest, Ashley Machek and Mingma Norbu Sherpa

Geography Alumni Award: 2010: John Legrid 2011: Weining Zhu, Melishia Santiago and Mingma Norbu Sherpa

Andrew Wise Memorial Scholarship: 2010: Heather DeRoy and Weining Zhu 2011: Samuel Davin and Timothy Grip



(Left) Award winners in 2010, L-R: Justin Herbert, Andrew Fraass, Dave Vaillencourt, Adam Brown and John Legrid.

(Right) Award winners from 2010

Front row: L-R: Brian Yellen, Sebastian Koenig, Christine Brandon.

Middle row: L-R, Melishia Santiago, John Legrid, Claire Pless, Xiaohui Huang.

Back row: L-R, Liam Bevan, Sam Davin, Kara Jacobacci, Weining Zhu, Sharon Adams, Heather DeRoy, Rachel Weiss.



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 Mrs. Annette L. Van Aken
 Mrs. Maria N. Waller
 Mr. Gregory J. Walsh
 Mr. Kenneth L. Walter
 Mrs. Susan H. Weddle
 Mr. Paul M. Wernau
 Mr. Scott B. Whitney
 Mr. William M. Wilcox
 Dr. Dennis M. Wilkins
 Lt. Col. Roger I. Williams (Ret.)
 Ms. Amy I. Winkler
 Prof. Donald U. Wise
 WJF Geoconsultants, Inc.
 Mr. Bruce S. Yare
 Mr. Alexander O. Zay
 Mr. Herman B. Zimmerman

We apologize if we have omitted anyone from this list. We are actively updating our records and will include new names in the next newsletter.

**Please use the attached envelope or www.geo.umass.edu to contribute on-line.
 If you are considering a larger gift, please contact Mark Leckie (head@geo.umass.edu).
 Alumni support can make a critical difference for students in the Department of Geosciences.**

GRADUATE SUPPORT – THE CRITICAL CHALLENGE

Perhaps the greatest challenge for the future of the Department is maintaining support for graduate students. The Department currently has 12 University- and Department- supported TA positions. We currently have many more applications to the graduate program than we can support, and many students end up choosing another program because we can't offer support or can't compete with other programs. We feel that developing endowed graduate support is essential for maintaining a strong

and broad graduate program into the future. This is one of our main development goals. Making a contribution to a graduate research or teaching endowment can enable a student to attend graduate school, and provide an opportunity to become a career geologist or to use geology to build a better career in any field. Please consider helping us to endow future graduate positions. And please feel free to let us know if you have ideas for developing enduring graduate student support.

JOSEPH HARTSHORN ENDOWED GRADUATE SCHOLARSHIP IN QUATERNARY GEOLOGY

Joe Hartshorn was a passionate, dedicated teacher, scientist, pioneer, and leader in his field. He came to UMass in 1968, retired as professor emeritus in 1987, and, sadly, he died on May 5, 2007. Although his interests were broad, Joe was particularly interested in glacial geology, and his studies of the glacial geology of New England set the standard for all who followed. He took a personal interest in the lives of students, and was always available to chat and share his wide experience, both in geology and life. His influence lives on in the successes and contributions of all of his former students. In order to pay tribute to his

memory, we have established the "Joseph Hartshorn Endowed Graduate Scholarship in Quaternary Geology". The scholarship was established in 2009 through gifts from Joe's family and friends, Department faculty, and alumni. We now hope to grow the fund so that it can significantly support student research and ultimately support a graduate fellowship in the department. In addition to the Hartshorn Scholarship project, our next goal is to fully establish the "Charles Pitrat Memorial Endowment Fund". Watch for notes in the next newsletter, but please contact us if you would like to help.

THE RANDOLPH AND CECILE BROMERY FUND

The Randolph and Cecile Bromery Fund is intended to support underrepresented graduate and undergraduate students interested in pursuing geology, especially African Americans, and it is also intended to support and enhance student field research. The fund has already helped to support several graduate students; it has partially supported geological field excursions, and it has brought guest speakers to the Department. The Fund has now grown sufficiently that we are initiating two new programs to recruit minority students: the *Randolph and Cecile Bromery Minority Graduate Fellowship* and the *Randolph and Cecile Bromery Minority Undergraduate Scholarship*. We sincerely thank Bill and Cecile Bromery for their generosity! "Bill" Bromery is our for-

mer Head of the Department of Geology and Geography, and Chancellor of the University of Massachusetts (1971-1979). During his distinguished career as an exploration geophysicist with the USGS and as a Commonwealth Professor at UMass, Bill also served as president of the Geological Society of America, President of Springfield College and interim President of Westfield State College. He has also received numerous honorary degrees and accolades, served on industry boards, as well as two terms on the President's Committee on the National Medal of Science. We are extremely proud to provide undergraduate and graduate student support and opportunities from the generous funds provided by Randolph and Cecile Bromery Fund.

MEMORIAL FUNDS SUPPORT STUDENT RESEARCH

The Department of Geosciences has six relatively modest Alumni Memorial Funds. The proceeds go directly to students, most commonly helping to support field expenses, attendance at field camp, or other costs associated with student research. Many alumni, at one time or another, have received some support from these funds, and many claim that the funds were critical in allowing them to complete their thesis or senior research. Please consider contributing to one of the memorial funds or possibly make a general contribution in support of student research, visiting lectures, or field excursions.

Elinor Fierman Memorial Fund--Established in 1983 by a gift from Jack Fitzpatrick (B.Sc., '76; M.Sc., '78). Elinor Fierman graduated in the class of '76 and went on to Duke University. In the spring of 1977, she was killed by a car while studying roadside geology. This award in her name is given to a student researcher (undergraduate or graduate) with a preference given to laboratory studies.

Geography Alumni Award Fund--Established in 1995 from gifts given by Geography alumni, the award is given either to support Geography graduate student research or to any student in the Geography program for other worthy purposes.

Gloria Radke Memorial Fund--Established in 1984 from gifts given by family and friends of Gloria Radke, a graduate student interested in Pleistocene geology. At the end of her

first year here, she was killed by a drunk driver on the S-curve by Atkins Farm Stand in South Amherst. This award is given to graduate students in support of field research.

H.T.U. Smith Memorial Fund--H.T.U. Smith was Head of the Department from 1956-1969. This award in his name is given to support field work with preference to undergraduate students (including enrollment in a field course).

Leo M. Hall Memorial Fund--Leo Hall was Professor of Geology in this Department from 1967 until his death on December 26, 1985. Among many other qualities, Leo was noted for his devotion to field study and to the teaching of field methods. This award in his name is given to graduate students in support of field research.

MEMORIAL FUNDS SUPPORT STUDENT RESEARCH

Andrew D. Wise Memorial Endowment Fund--Andrew D. Wise was an undergraduate geology major in the department (BS-1983). After graduating, he worked as a hydrogeologist with Weston & Sampson in Peabody, MA. He played the trumpet and was an avid skier and cyclist. In 1998, he traveled through the country for six months on a motorcycle, visiting many of the National Parks, and finally settling in San Diego, California where he was employed by Gradlent Engineers. He died on July 18, 2006. In June of 2007, Richard and Geraldine Wise established the Andrew D. Wise Memorial Endowment Fund in memory of Andrew. The purpose of the Fund is to provide support to students in the Geology Program for expenses, programs, and experiences for which other support is not available. We welcome contributions to this important fund.

DEPARTMENT OF GEOSCIENCES
University of Massachusetts Amherst



2011

UMASS AMHERST 2012
DEPARTMENT OF GEOSCIENCES
CALENDARS COMING THIS FALL!

This calendar features many beautiful photos showing geoscientists in action, submitted by various folks from the department.

You can purchase your calendar for \$15.00 by contacting us at 413-545-2286, or you can receive one as a gift when you make a contribution to any of the department funds.

Please use the attached envelope to send your gift to us, or navigate to www.geo.umass.edu to contribute online.



Geosciences Department annual group photo, April 2011.

DEPT. NEWS, CONT'D.

particular responsibility for IGBP's participation in the March 2012 "Planet under Pressure" conference, to be held in London (see: www.planetunderpressure2012.net). He was also appointed Vice-Chair of the Global Environmental Change Section of the American Geophysical Union (AGU) and a member of the AGU Council. His new book, *Global Warming and Political Intimidation*, was published by the University of Massachusetts Press in July 2011.

Some news from **Alan Marcus**: My wife and dogs still live in Greenfield, while I rent an apartment here in Baltimore (Alan is teaching at Towson University) - I go back-and-forth every time I can to visit them. I have been publishing quite a bit, including peer-reviewed journal articles, book-chapters, and have an upcoming new book on the geography of Brazil (published by John Wiley and Sons) - the only current one available in the English language. I miss Dick Wilkie's insights, but stay in touch with him regularly.

NEWS FROM THE OFFICE OF THE STATE GEOLOGIST

By Steve Mabee, Massachusetts State Geologist

Greetings from the Massachusetts Geological Survey! That's right, in August 2010 we officially changed our name and we have a new logo. Our revised enabling legislation, which was approved in 2006 by the state legislature, allows us to use that name.

This September we will begin our tenth year of operation here in the Department of Geosciences. It is a good time to reflect on how far we have come in the first nine years. We started in 2002 with nothing, just an idea and a vision of what we could accomplish. Over the last nine years we have accumulated over \$2.2 million in outside funding, produced 18 bedrock geologic maps, worked with the USGS, FEMA, NPS, DOE, other state geological surveys and state agencies, and currently we have 10 people working for the survey on various projects, all living on soft money. We are a "small entrepreneurial survey", a model that seems to work best in the current economic climate. Much has been accomplished. We have rejuvenated the mapping program in Massachusetts, developed collaborative research opportunities with other faculty at UMass as well as other universities and tried to increase the value and visibility of the survey. We still have a long way to go but I appreciate all the support many of you have provided.

Joe Kopera begins his ninth year with the Survey and continues to coordinate all bedrock mapping efforts in the Commonwealth as well as maintain the Survey's web site. Joe is supported mostly by STATEMAP funding from the USGS but has helped on many other projects. He remains an integral part of the Survey's success. **Steve Nathan**, who has worked off and on with the Survey for several years on various projects, has moved on to take a teaching position at Eastern Connecticut State University. I want to thank Steve for his dedication and



tireless service over the years especially during the lean times when funding was sparse. He will be missed. In August 2010, we welcomed **Chris Koteas** to our staff as a post doctoral fellow after receiving his doctorate from UMass in the fall of 2010. Chris is working on a three-year DOE grant that we received via the Arizona Geological Survey to examine geothermal potential of granitoid rocks in Massachusetts and Connecticut. **Mike Rhodes** and **Dave Boutt** are co-PIs on this project. **Maria Fernandez** continues in here eighth year as our GIS specialist. She handles all the challenging GIS map-

ping projects and is currently working with **Peter Robinson** to publish the Mount Grace quadrangle. We were very fortunate to have help from **Peter Thompson** (Umass alumnus) and **Matt Massey** over the last year. Peter, who normally works in New Hampshire and Vermont, was the lead mapper for the new bedrock geologic map of the Boston Harbor Island National Recreation Area. Matt published the Palmer quadrangle in 2006 as part of his Ph.D. dissertation work at the University of Kentucky but came back in 2010 as a mapping contractor to finish the Billerica quadrangle. The Survey certainly benefited from the help of other individuals over the last year. I want to thank **Don Sluter, Teresa Gagnon, Nathaniel Goodhue, Corey League, Sharon Adams, Mandy Toong, Rachel Weiss, Forrest Iwanik, Joe Schmidt** and Mike Vollinger.

Some of the recent activities of the Survey are highlighted below.

- We secured a ninth year of STATEMAP funding from the USGS to continue bedrock mapping in the northern portion of the Clinton quadrangle and to prepare a seamless onshore-offshore surficial geologic map of the Provincetown quadrangle. For this latter project we will be collaborating with **Mark Borrelli** at the Provincetown Center for Coastal Studies.

- We are about to submit the final draft of the new bedrock geologic map of the Boston Harbor Islands National Recreation Area to the National Park Service (NPS). This work was funded through a program at NPS run by **Bruce Heise**, a UMass geology alumnus. His support on this project is greatly appreciated. This map encompasses bedrock geologic mapping of approximately 34 islands in Boston Harbor and was completed by Peter Thompson with help from Joe Kopera and **Dan Solway** (a recent UNH graduate). New geochemical data was obtained for some of the dikes on the islands. More importantly data from the 9-mile sewage outfall and the 5-mile inter-island tunnels were compiled and reviewed in a geologic context for the first time and included as part of the map. In particular, the inter-island tunnel provided data allowing for construction of the first ever continuous, 5-mile long, cross-strike profile across the Boston basin.

- In August 2011, we completed the seamless onshore offshore surficial geologic map of



Chris Koteas (left), Mario Carnevale (center) and Professor Marty Ross (Northeastern) conversing during the Boston Harbor Island geologic map field review in July, 2011, led by Peter Thompson.

Plum Island, which includes the Newburyport East and northern portion of the Ipswich quadrangles. The map consists of three sheets and provides a complete history of the evolution of Plum Island as interpreted from the numerous seismic lines, boreholes and GPR surveys. The work is a collaboration among the Massachusetts Geological Survey, **Byron Stone** (USGS), **Walter Barnhardt** (USGS Woods Hole), and **Duncan Fitzgerald** and **Chris Hein** at Boston University.

- **Maria Fernandez** is also just finishing up the Mount Grace quadrangle in west central Massachusetts. This is all part of an effort to continue to publish legacy mapping by Peter Robinson. We continue to collaborate effectively while Pete works away in Norway.

- **Matt Massey** is just completing the new bedrock map of the Billerica quadrangle that was started by Joe Kopera last year. We are hopeful that we can enlist Matt's mapping expertise again sometime in the near future.

- As mentioned above, we received a three-year grant from the DOE Geothermal Technologies Program to help populate a national geothermal database. This is actually a subcontract with **Lee Allison** (UMass alumnus) at the Arizona Geological Survey. Lee spearheaded an effort by the Association of American State Geologists to submit a proposal to DOE on behalf of all the 50 state geological surveys to build and populate the national geothermal database. The total funding awarded was \$22.5 million. Our portion is about \$516,000. Aside from compiling well temperature, thermal conductivity, and warm spring chemistry data, we are sampling all the granitoid rocks in Massachusetts and Connecticut and conducting whole rock and trace element analyses on all the samples. Mike Rhodes has developed an exploration tool that allows us to use heat production (determined from the U, Th and K concentrations and density), along with measurements of thermal conductivity of the samples, and assumptions about heat flow to model the temperature as a function of depth. As you know, not all granites are created equal and some are hotter than others. This tool allows us to identify potential hot spots that might be suitable for

enhanced geothermal system development in the future. More on this technique and preliminary results of this study will be presented at upcoming AGU and GSA meetings. The chemistry data will also produce an unprecedented geochemical data set for southeastern New England that can be used to help interpret the tectonic evolution of our granitic rocks.

- We have funding from the Massachusetts Clean Energy Center to examine the potential of sequestering carbon dioxide in Connecticut Valley basalts. **Carrie Petrik**, an MS student in geology, has been running experiments in the lab on the Holyoke and Deerfield basalts. CO₂ is pumped into a pressure vessel containing crushed basalt at temperatures ranging from 20 to 100 °C and pressures ranging from 800 to 1400 psi. We are producing a host of carbonate minerals in as little as 3 hours that are verified by SEM, microscope and XRD analysis. Interestingly, we can produce carbonate minerals under non-supercritical conditions and the Holyoke basalt appears to be one of most reactive basalts that we know of in the world.

- **Joe Kopera** represented the Massachusetts Geological Survey at the Jurassic Road Show held recently in Greenfield, MA to celebrate the 200th birthday of Franklin County. It provided an opportunity for fossil fanatics, rock hounds, dinosaur lovers and others to bring their rocks and fossils in to be identified by experts. **Dr. Paul Olsen**, **Dr. Mark McMenamin**, **Steve Winters**, **Professor Richard Little**, and other local experts were on hand along with Joe to help identify samples. The tent was a popular venue, with many people poring over geologic maps of Franklin County.

- We continue to collaborate with **Kevin Maher** (Thermonexus, LLC), **John Kastrinos** (Haley and Aldrich), **Brian Smith** (Allied Consulting Engineering Services) and **Joe Cerutti** and **Paul Blain** (MADEP) on a one-credit course called "Ground Source Heat Pumps – Concept to Completion". The course is aimed at professionals and students and we have now taught the course twice. It is being offered through the University of Massachusetts Continuing and Professional Education program.

STAY CONNECTED WITH UMASS GEOSCIENCES!

Look for familiar faces (both presenters and attendees), department information booths, and gatherings for alumni and friends at upcoming meetings:

Geological Society of America (GSA) annual meeting, October 9-12, 2011, Minneapolis, MN
Graduate School information forum, Sunday and Monday;
private alumni party Monday evening

American Geophysical Union (AGU) fall meeting,
December 5-9, 2011, San Francisco, CA

American Association of Petroleum Geologists
(AAPG) annual meeting, April 22-25, 2012, Long
Beach, CA
Alumni gathering



A look into the old room 231, which is now the newly remodeled Joseph Hartshorn Quaternary Laboratory. (Story, see p. 5)

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HIGHLIGHTS FROM THIS EDITION OF THE NEWSLETTER:

- **First Geosciences Alumni Reunion at UMass on the weekend of October 14-16, p. 2**
- **New initiatives for minority recruitment from the Randolph and Cecile Bromery Fund p. 2 and p. 16**
- **Geosciences new role in the UMass Environmental Science Program, p. 8**
- **Four new faculty join the Department, p. 6**
- **The new Hartshorn Quaternary Laboratory opens this month, p. 5**
- **The Trail of Time opens at the Grand Canyon, p. 8**
- **Lake El'gygytyn (Siberia) makes an impact on climate science, p. 9**
- **5 College Geology field trips across the Colorado Plateau, p. 3**

KEEP US IN THE FIELD

Field experiences enrich every part of our undergraduate and graduate education. The key is having department vans available so classes can head out into the field during afternoons and weekends. We continue to seek funding for new vans through all possible means. As in the past, alumni gifts greatly strengthen our position. Your contribution will help us keep our field component as strong as ever.



Please contact the Department of Geosciences if you have any questions or comments about this newsletter. We plan to publish this on a regular basis, so please let us know if you have suggestions for improvement. We would love to hear from you, please send news updates to: head@geo.umass.edu.

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