**FACULTY**

**Suzanne L. Baldwin** – sbaldwin@syr.edu -- Prof. Baldwin specializes in noble gas thermochronology, P-T-t evolution of crustal terranes, plate boundary processes in the southwest Pacific, continental extensional tectonics.

**Paul G. Fitzgerald** – pgfitzge@syr.edu -- Prof. Fitzgerald specializes in low-temperature thermochronology (fission track, U-Th/He) applied to tectonics in extensional, convergent and strike-slip regimes in Antarctica, the Basin and Range Province, Papua New Guinea, Alaska and the Pyrenees.

**Gregory D. Hoke** – gdhoke@syr.edu -- Prof. Hoke studies the interactions of climate and tectonics on the earth’s surface using geomorphology and the stratigraphic record. His active research projects are in the southern central Andes and SE Tibet.

**Linda C. Ivany** – leivany@syr.edu -- Prof. Ivany specializes in evolutionary paleoecology, geobiology, and paleoclimatology.

**Christoper Junium** – ckjunium@syr.edu -- Prof. Junium is a stable isotope and organic geochemist focusing on use of organic molecules and products (particularly nitrogen and carbon based molecules) as proxies for global climate change through geological time.

**Jeffrey A. Karson** – jakarson@syr.edu -- Prof. Jeff Karson’s expertise lies in structural geology and tectonics of oceanic spreading centers and the relationships between magmatic construction and mechanical extension.

**Laura K. Lautz** – lklautz@syr.edu -- Prof. Lautz specializes in physical hydrologic processes and their influence on water quality and movement through watersheds.

**Zunli Lu** – zunli@syr.edu -- Prof. Lu specializes in low temperature geochemistry and uses a variety of methods (trace elements, isotopes and models) to investigate crustal fluids, carbon cycle and global environmental changes.

**Robert Moucha** – rmoucha@syr.edu -- Prof. Moucha is focused on large-scale solid-earth geophysics and geodynamics through the use of remote sensing data and computer modeling as tools in visualizing mantle circulation and dynamics as expressed at Earth’s surface.

**Cathryn R. Newton** – crnewton@syr.edu -- Prof. Newton’s scholarly work involves studies of modern and ancient biodiversity, including the quantitative dynamics of ancient and modern mass extinction.

**Scott D. Samson** – sdsamson@syr.edu -- Prof. Samson’s research includes U-Pb geochronology and Nd-Sr-Pb isotope geochemistry. These techniques are used to address diverse topics ranging from tephrochronology, to unraveling the evolution of orogenic belts, to tracking the birthplaces of suspect terranes.
FACULTY

Christopher A. Scholz – cascholz@syr.edu -- Prof. Scholz specializes in sedimentary geology, the geologic record of climate change, paleolimnology, and sedimentary basin analysis.

Donald I. Siegel – disiegel@syr.edu -- Prof. Siegel is interested in peatland hydrogeology and geochemistry, contaminant transport in groundwater systems, and competitive chess.

Jay Thomas– jthom102@syr.edu -- Jay’s research focuses on using laboratory-based experiments to reproduce conditions that exist on or in the Earth to make crystals, melts and rocks.

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Cover Photo: Carlsbad Caverns Limestone Stalagmite
Credit: Anthony Fiorentino III

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MESSAGE FROM CHAIR DON SIEGEL:

Greetings alums and friends! After my 2nd year as Chair, I can report on many good things that have come to Earth Sciences this past year. First the good: we have two new junior professors, Jay Thomas and Christa Kelleher. Jay has written a piece about his research in this newsletter. He’s an enthusiastic new member of the department who officially joined us in January of 2015. He offers strength in the mineralogy and petrology portions of our curriculum. He also offers me tips on bike riding: Jay competes, I do not - hence the instruction.

Christa Kelleher uses mathematical methods to solve hydrologic problems at multiple scales. She, too, has a piece in this newsletter to introduce herself to you. Crista has a joint appointment (25% of her time) with Civil and Environmental Engineering (CEE) as part of a new collaboration coupled to Syracuse University’s Water Initiative. We may soon get 25% of a companion water hire at CEE to add to our Departmental hydrologic strength. Christa will officially join the department in January of 2016.

There is other good news. Professor Laura Lautz headed up a 3-million dollar proposal to NSF to win a multidisciplinary grant as part of its new National Science Foundation Research Traineeship (NRT) Program. She and her colleagues beat the 2% odds to win it--on the first try no less. This grant, which Laura highlights in her piece in this newsletter, involves coupling energy and water, including field trips for graduate students to Africa to work with Prof. Chris Sholtz.

As part of the NRT project, the Department captured the 3rd floor library space located above the lower atrium for our use. This space will house Departmental and NRT offices and include collective work space. The Earth Science library will be moved to a facility on the south campus as part of general library consolidation. Our current office suite will be repurposed for needed additional office space.

This move of the Geology library is bittersweet for some of us - we fondly remember our times working and researching there. However, we think the move will be for the good, since space has gotten tight with expanding faculty and students combined.

Other faculty also have had notable funding successes, including Professor Chris Junium winning a coveted NSF Career Grant. Students have been publishing too, along with their advisors. And Jeff Karson’s Lava Project website has gotten more internet “hits” than the entire rest of the college.

In short, we are doing very well here at the department. Please read the faculty and graduate student updates on their research and successes!

Now for future challenges: SU’s Fast Forward initiative, led by Chancellor Syverud, will lead to new construction in the future, probably renovation of the Carrier Dome next to Heroy Geology Laboratory where we have been housed since 1972. Engineers will study this summer the extent to which vibrations from potential construction activities might adversely affect Earth Sciences’ and Physics’ sensitive chemical and physical analytical instrumentation. If this instrumentation will be compromised, then both Departments have the challenge to find ways to continue important research. It is possible a spanning new science building adjacent to the Science and Technology Center may house us in the future. Although potential construction has negatives, it also includes potential for opportunities we have not had in the past.

Do come by for a visit if you are in the Syracuse area, and please don’t forget to consider an end-of-year contribution to one of our donor accounts that so greatly help our undergraduate and graduate students in their educational experiences here - from supporting field work to assisting them to go to conferences to present papers on their research efforts. Without alumni support in this time of rather severe fiscal austerity in funding sources, it would be difficult to offer our students the kind of help they need to get the best education possible from us.

Best Regards.

Don
OPPORTUNITIES TO CONTRIBUTE TO YOUR DEPARTMENT

DONALD P. AND RUTH SHIRLEY ELSTON EARTH SCIENCES ENDOVED FUND: Endowed fund named for alumni Donald (BA ’50, MS ’51, Geology) and Shirley (BA ’50, History) Elston. Supports research and faculty development in the Department of Earth Sciences.

GEOLOGY ENDOVED DEVELOPMENT FUND: Used at the discretion of the Chair for activities that enhance the Department.

JOHN JAMES PRUCHA FIELD RESEARCH FUND: Used to help our graduate students cover the costs of their field studies.

JOHN J. PRUCHA PH.D., EARTH SCIENCES ENDOVED FUND: Created in 2010 by Dr. Carlos Dengo (BS ’76), this fund honors Professor Emeritus John J. Prucha. It is intended to enhance the quality and academic breadth of the faculty of the Department of Earth Sciences. It stands side-by-side with the Prucha Field Research Fund that supports student research.

GEOLOGY DEPARTMENT GIFTS ACCOUNT: Gifts to this account are used to purchase software/hardware upgrades for our student computer lab, new maps and displays, field equipment or other needed items.

K. DOUGLAS NELSON MEMORIAL FUND: This endowed memorial fund supports research for outstanding graduate students.

ALEC G. WAGGONER MEMORIAL FUND: This fund is used to support graduate student research proposals.

EARTH SCIENCES FIELD CAMP FUND: This fund is used to assist students with respect to attending field camp.

GEOLOGY ENDOVED FOR STUDENT RESEARCH FUND: Gifts to the account are used to assist graduate students in funding research projects which can include travel assistance to national meetings and publication charges.

Donations to any of the above funds can be made by mail. Please make your check payable to Syracuse University and indicate the fund to which you are contributing on the memo line.

Mail to: Syracuse University, College of Arts and Sciences, Office of Advancement, 307 Hall of Languages, Syracuse, NY 13244-1170.

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William Bayard Heroy, my grandfather, met his future wife, Jessie Minerva Page, while both were students at Syracuse University. They had four children: John Neuman, William Bayard, Jr. (Bill), Laura Page and Frances Totten, who was my mother. My mother, a graduate of Mount Holyoke, was hired by American Cyanamid Company in NYC where she met my father, Claude James Kirkland, Jr. My father graduated from Columbia with degrees in Chemical/Mining Engineering (Ch.E.) and took courses from some of the greats in geology, Paul Kerr, Douglas Johnson and Charles Berkley. Some of my parent’s first dates were at AIME functions. My grandfather was a member of the AIME and a personal friend of Herbert Hoover, a prominent Mining Engineer. Incidentally, my Aunt Laura married Joe Singewald, Professor at Johns Hopkins and Maryland State Geologist. Somehow, I think I was destined to go into Geology. William Bayard Heroy’s lifelong hobby was the glacial geology in the Ellenville, NY region. I made sure that his work in the Ellenville region was published.* This was not difficult as my first love in geology was glacial geology thanks to Ernie Muller and I did my dissertation in the Western Catskills under Don Coates at the State University of New York at Binghamton. At that time I had little idea that my grandfather had worked in the eastern Catskills and had been in frequent contact with John Lyons Rich. Although best known for his part with Geotechnical Corporation, my grandfather’s early career was with the USGS water resources division and later as Chief Geologist for Sinclair Oil, which he joined shortly after Harry Sinclair went to jail for the Teapot Dome episode. He used to visit Harry at the jail to discuss business. In those years he spent a lot of time in Columbia and Venezuela helping to open up the oil fields. He packed a .45 on his belt and was inducted into the Explorers Club because of his extensive travel in the Andes on mule back. Later in life he went into a partnership with Rolland Beers, Beers and Heroy, which he subsequently bought out and turned into Geotechnical Corporation, which became well known for its geophysical work, driven by monitoring Russian nuclear tests. This ultimately led to a much better understanding of the Earth’s interior. Granddad also served on several corporate boards and testified before Congress. He commented to me that in those days it was considered an honor to be asked to serve on a corporate board and at the end of a term they might give you a hundred dollar gold piece as a token of their appreciation. That is a far cry from the millions paid to board members today.

Granddaddy actually started as a Chemistry Major. He switched to geology and went to work for the U.S.G.S. prior to graduating. After working in places like Idaho and Montana he went to his boss to see if he could take leave to finish his degree. He told me that his boss didn’t really understand why, as he didn’t have a degree. He finally prevailed and met with Cramer T. Hopkins to discuss finishing. Hopkins asked him how many credits he needed, to which he replied, two. Hopkins asked him what he had been doing, upon which he produced copies of some of his work. Hopkins pulled out a piece of paper and wrote “Field Work, 2 credit hours” and said “take this to the registrar and then go marry that girl you are going with”. That type of thing sure doesn’t happen now so in a way I have the Geology Department for my very existence. The family connection goes much farther, as my Grandmother’s sister, Laura Page was also a student at Syracuse. She married her History Professor, Alexander Flick who became New York State Historian. Yes, those kind of things even happened back then. In her 90’s she told me of going into her history class, looking up and seeing a handsome young man with a mustache. She said that she knew right away the he was the man for her, so she married him. I also met my wife of 49 years in lunch line at Syracuse. I sure wasn’t there for the food. William B. Heroy, Jr., my uncle, Dartmouth (BS) and Princeton (Ph.D.), was one of the early geophysicists before such animals officially existed, and actually worked for Rolland Beers before my grandfather went into a partnership with him. Later my grandfather set up the merger of Geotechnical Corporation with Teledyne where Bill became the “Number Two Man at Teledyne” Later he left Teledyne, became the financial Vice President at SMU and served as Treasurer of the GSA for several years.

In 1967 I discussed the possibility of returning to Syracuse for a graduate degree with John Prucha. Not long after that my grandfather made the donation that made the William B. Heroy Geology Laboratory possible. Obviously, that changed my plans. My grandfather also funded a second building, the Center for Earth and Man, at Southern Methodist University. It is interesting that both institutions were started by the Methodist Church. SMU named the building after William Bayard Heroy’s father, Neuman Lounsbusy Heroy, an upstate New York Methodist Minister, but Syracuse named its building directly after William Bayard Heroy. Neuman was a graduate of Cornell where
he roomed with David Starr Jordan and later preached evolution from the pulpit.

For those of you who are used to seeing the picture of my grandfather hanging in the Geology Building, he did have hair at one time - proof is in the picture on previous page! So did my uncle Bill for those of you who remember him as well as myself.

The Building:

New Renovations in Heroy

Heroy Geology Laboratory has been a busy place during the summer of 2015. There have been three major renovation projects under way. The first is a long-overdue renovation of the Introductory Teaching Laboratories, Rooms 102 and 110. Even recent alums will remember that these laboratories were designed as more-or-less “classical” chemistry labs, with fume hoods, sinks, and laboratory benches with racks and shelves for reagents, etc. As our approach to teaching introductory laboratories has moved toward increased use of technology and the introduction of basic petrographic microscopy, the need to redo these labs became acute. So, as the pictures below will show, the old laboratory benches are gone and have been replaced---in re-done, light, airy rooms, by movable tables with adjustable height. There are now large flat-screen monitors to facilitate the use of videos and other available teaching materials.

A second major project is the construction of a new handicapped accessible ramp. The new ramp was required because the existing ramp, which many alums will remember, was determined to be too steep to meet ADA requirement. The new ramp, as seen in the picture below angles away from the Heroy entrance towards Holden Observatory.

A third major renovation has been the re-configuring of Room 215 to become the office-laboratory of our new hydrogeologist, Christa Kelleher. Room 215, like so many rooms in Heroy, was fitted out with a fume hood and other laboratory facilities, but Christa’s needs are for computing facilities and space. Thus, the fume hood has been removed and the room re-configured. You can read more about Christa and her work in the following section on new faculty.

The Geology Library yields to the Digital Age, but good things come!

As the picture below will show, the Geology Library is gone. Many alums, former faculty, and indeed current students and faculty, have very mixed feelings about this event, for the Library was a great asset to the Department. However, its demise is testimony to the advancing “electronic revolution”. Increasingly most scholars get their journals and books on line, and it became evident years ago that the Library was under-used. The current closing is part of the university’s on-going program to close branch libraries and consolidate the collections. However, take heart! The Geology Library collections have been moved to a university facility at which they will be available on demand. Moreover, the very large Library space will soon be completely renovated to provide for the Earth Sciences Administrative Offices and also for the new NRT Program in Water-Energy Resources (see below).
The Department Welcomes New Faculty

Jay Thomas.

Last year we introduced you to Dr. Jay Thomas, who has now been in the department since January of 2015. The good news is that Jay’s research laboratories, located on the Ground Floor, are now completed, and Jay is installing the large presses and furnaces that he uses in his experimental petrology studies. In addition to the presses and furnaces, Jay has some sophisticated analytical equipment. Jay has given us the following account of his research and teaching:

It’s been an exceptional experience during my first semester and summer at Syracuse University—the Department, College and University have really helped launch my research program into high gear! Construction of my laboratory began before I arrived in January. Experimental equipment fabricated here in SU’s Physics Machine Shop will provide researchers with capabilities to study natural and synthetic (experimental) geochemical systems over a range of pressures and temperatures that extend from the Earth’s surface conditions to depths up to approximately 100 miles and up to >2000°C. We have also built a fantastic laboratory complete with facilities to prepare materials for experiments and analysis. Fluid inclusions can be studied using a heating cooling stage (-196 to 600°C) that is attached to a petrographic microscope. A Fourier transform infrared spectrometer and infrared microscope system can be used to probe the molecular structure and composition of materials. The FTIR system has infrared ‘light’ sources and detectors capable of measuring vibrational frequencies of molecules in the mid- to near-infrared spectral regions of materials (solid, liquid, or gas). The IR beam can be transmitted or reflected on spots down to <15 µm in diameter. The experimental and analytical laboratories can be used to explore geologic systems that range from sedimentary basins through a significant portion of the Earth’s upper mantle.

During May incoming graduate student Mitchell Ladig and I conducted field work to study the Latir Volcanic Province in northern New Mexico. We collected granitoid composition plutonic rocks and felsic volcanic samples. We were particularly focused on collecting quartz and feldspar crystals from miarolitic cavities in a shallow level granite (see photos). Some of the miarolitic cavities were nearly one meter in size and contained fist-sized quartz crystals!

When Mitchell arrives in August 2015 to begin his graduate work we will study the compositions of fluid and melt inclusions, and the compositions of the crystals from the Latir Volcanic Province to develop new methods to determine depth and temperature of crystallization for igneous rocks.

The upcoming semester will surely keep me busy. My wife Christine, son Jack and I will be welcoming a new boy to our family—he’s due any day now! It will be challenging to balance the predicted lack of sleep with continued expansion of my new research program here at SU!

Christa Kelleher.

Christa Kelleher will join the faculty in January, 2016. She is a hydrogeologist who specializes in modelling; she will add an exciting new dimension to the growing program in hydrogeology in the department, that will now include a major National Research Training program run by Laura Lautz and colleagues in Civil and Environmental Engineering (see below). Christa has sent us the following account of her plans for her work at Syracuse:

I will start as an Assistant Professor in the SU Department of Earth Sciences in January 2016. My expertise lies in computational hydrology. I use watershed, solute transport, and water quality models to understand and predict how water and the things it carries move at and below the earth’s surface as well as how this is influenced by geology, terrain, climate, and vegetation.

Photographs taken while conducting field work in New Mexico during May 2015. (a) Photograph taken from Latir Volcanic Field, NM looking towards the west. (b) Miarolitic cavity in granite that contains quartz and feldspar. (c) Some of the quartz and feldspar crystals collected from a miarolitic cavity. Smoky and clear quartz were common in cavities. (d) View from the Rio Grande Gorge bridge.

Christa at work.
I plan to build a research program at Syracuse that will utilize a combination of modeling and observations to understand how stream and groundwater quantity and quality vary in time and space at both local and regional scales. This type of work will help to improve predictions of watershed responses to changing land use or climate, to better interpret how groundwater systems or streams respond differently during dry or wet times, and to potentially explore the implications of these changes for in and near stream ecology that require certain types of habitat to survive. I also have a strong interest in scientific visualization, improving how we use graphics to communicate, and plans to continue to explore this area through interactions with the broader Syracuse community. I earned my PhD in 2013 from the Pennsylvania State University and have been working as a Postdoctoral Associate for the last two years within Duke University’s Earth and Ocean Sciences Department.

The EMPOWER Program

The following item appeared in the SU News. It is exciting news about a new program shared between Earth Sciences and Civil and Environmental Engineering:

“At Syracuse University, “interdisciplinarity” isn’t just a buzzword; it’s a way of life. Nowhere is it more apparent than among a group of faculty members who recently received a $3 million grant award from the National Science Foundation (NSF). The award supports a new graduate-level training program called the “Education Model Program on Water-Energy Research” (EMPOWER).

Led by principal investigator Laura Lautz G’05, associate professor of earth sciences, EMPOWER involves other faculty from the College of Arts and Sciences, as well as from the College of Engineering and Computer Science and the S.I. Newhouse School of Public Communications. Faculty include Charles Driscoll, University Professor and director of the Center for Environmental Systems Engineering; Christopher Scholz, professor of earth sciences; Donald Torrance, associate professor and director of science communications; and Peter Wilcoxen, associate professor of public administration and international affairs and director of the Center for Environmental Policy and Administration.

Lautz says the funding will provide students with the skills, knowledge and competencies they need to succeed in various STEM (science, technology, engineering and mathematics) fields.

“We’ll be able to train a new cadre of scientists and engineers with a broad knowledge of interactions between the water cycle and the preservation, production and consumption of fossil fuels for energy,” says Lautz, also an adjunct assistant professor at the SUNY College of Environmental Science and Forestry. “Such training might lead to professional opportunities in industry, government and education.”

“This major federal funding is great news for Syracuse University and the entire Central New York region,” says U.S. Senator Charles E. Schumer of New York. “The National Science Foundation chose wisely when it selected SU to implement this pilot program aimed at advancing our understanding of water and energy consumption on our planet. This program will train our students in these fields as they prepare for good-paying future jobs in the STEM arena. I have long fought for these kinds of funds and will continue to do so on the federal level, as they allow our nation to maintain its competitiveness in the 21st century global economy while preparing our students to become the innovators of tomorrow.”

EMPOWER is the latest in a string of successes for the University’s Water Science and Engineering Initiative, jointly funded by the Office of the Provost, and the colleges of Arts and Sciences and Engineering and Computer Science.

“The grant marks the culmination of years of effort,” says Lautz, calling it a “vote of confidence” from the NSF. “I’m honored that what we’re doing is impacting our respective fields, while drawing national attention to the University.” That the team’s proposal was one of only eight to be funded, from an application pool of nearly 260, makes the achievement all the more remarkable.

Driscoll, a leading advocate of scientific and technological literacy, says EMPOWER will train students to better analyze, interpret and present their findings in a context that will be useful to energy and water managers and the environmental community.

“Because of our commitment to interdisciplinarity, the University is poised to become a national leader in graduate-level STEM education,” he says. “I look forward to working with my colleagues in conceptualizing and deploying a program that positions our students for success in multiple fields.”

The grant provides a one-year, $32,000 stipend for up to 46 students. It also underwrites the development of various domestic and international field courses, including one in Rwanda; a seed-grant training program; and an external advisory committee made up of nationally recognized professionals.
“What I like most about EMPOWER is that students are the beneficiaries,” Lautz adds. “Almost all of the award goes directly to them or to programs benefiting them. The F&A [facilities and administrative] costs are relatively small, so that they get the most out of the experience.”

A Change in the Merriam Award:
Many alums will remember the award of the “Faye Merriam Prize”. This award was given in honor of Faye Merriam, the father of former Departmental Chair Daniel F. Merriam. Recently, Dan and Annie Merriam made a significant gift to the university and asked that the Faye Merriam Endowed Prize Fund be changed to the Daniel F. Merriam Endowed Scholarship. The Merriams, of Lawrence, Kansas, have directed that the proceeds of the fund be used to “provide research support to College of Arts and Sciences masters or doctoral students in the Department of Earth Sciences”. The Department is grateful for the continuing support of the Merriams!

News of Alums
The Department always welcomes news from our alums. This year we are fortunate to have some great pieces from three highly successful alums:

The first item is a truly delightful “recreation” of a past event. Thanks to Professor Emeritus Bryce Hand for staging this one!

Mike Thonis (B.S. ’71) served as my TA in summer 1971, helping with a six-week classroom/laboratory/field course for 15 outstanding high school students. One of those students was Ron Chapin, who took the original picture. Ron contacted me through ESPRIT (a listserv of 2000+ pre-college teachers we’re both active in), asking if I’d mind his posting it. Several listees recognized me. (Later, he posted it again, along with the 44-years-later reenactment.)

Ron’s photo was taken either along the south side of Erie Boulevard, where the Syracuse Formation is full of gypsum and offers up molds of salt hopper crystals, or near Green Lakes State Park (where similar rocks are exposed).

The placard is a lithofacies map showing Late Silurian evaporite basins.

Our retake on May 8, 2015 featured the original actors — after four-and-a-half decades of natural weathering. The outfits cost $12 at our local Good Will store. By an amazing coincidence, Mike had come here from Boston for a meeting of the SU Board of Trustees! A two-hour slot on Friday morning of Commencement weekend was the only time Mike wasn’t scheduled to chair a session, and so could duck out. We picked him up after breakfast at the University Sheraton and drove to Heroy. Don Siegel’s office served as the dressing room where Mike could trade his suit and tie for more authentic clothing (white jeans and dark leather belt that he provided and the orange shirt from Good Will).

Ken Ranlet (B.S. ’73) carefully arranged us and took the picture, and deserves credit for editing out a bit of brick wall. Ken’s son, Mike Ranlet, helped import the Silurian background.

After the photo shoot and some laughing about old times, Mike switched back into formal dress and returned to join his fellow trustees as though nothing had happened. Who says trustees and professors who’ve been out to pasture for 16 years can’t have fun?! We had a ball!

Linda Sternbach, BS 1981
Linda Sternbach (BS, 1981) has been awarded the 2014-2015 Gerald A. Cooley Award by the Houston Geological Society. The citation reads (in part): “The HGS Board is very proud to recognize Linda R. Sternbach with the Gerald A. Cooney Award, the highest award presented by the HGS, for her efforts to improve how HGS communicates its monthly events and meetings to Society members, and for her continuous volunteer service to HGS since 1985. Through it all, her goal has been to make HGS more rewarding to its members.”
After receiving her BS in Geology from Syracuse, Linda received an MS from Rensselaer Polytechnic Institute. From her high school days, Linda has had an interest in photography and journalism, talents she has used in her work in creating HGS videos. Congratulations Linda!

Jack Ridge (PhD, 1985)

Writing for the SU Geology newsletter comes at an appropriate anniversary for me. It will be 30 years in December that I graduated from the department with my Ph.D. under the direction of Ernie Muller. Even more amazing to me is that when I look at the department faculty there are still some familiar faces. A lot has happened since I left Syracuse to take an academic position at Tufts University in Medford, Massachusetts and writing this piece has regurgitated lots of fond memories. I am still at Tufts, currently a full professor, and have been chair of the department for the last three years. My main teaching areas are environmental geology, geomorphology, and glacial and Quaternary geology. This past May my wife Mary and I celebrated our 30th wedding anniversary and our twin sons Daniel and Christopher graduated from UMass Amherst. And just so you don’t think we are becoming “empty nesters”, we also have a daughter Rose Xiuqin who will be in 8th grade this fall.

Professionally, most of my work has focused on glacial varve chronology in the northeastern US in an attempt to assemble detailed deglacial sequences and to provide a better understanding of what varves can tell us about the interaction of climate and glaciers, and biological events. Glacial varves provide a wealth of information and allow the construction of not only time lines as varve thickness records but also a radiocarbon chronology from plant fossils, a paleomagnetic record, and a history of organisms in glacial lakes from trace fossils. We have even been able to document some fish (charr and sculpins) and crustaceans (ostracods and triopsids) that lived in glacial Lake Hitchcock in the Connecticut Valley. Much of this work recently culminated in a 2012 paper in the American Journal of Science that is co-authored with 6 of my undergraduate students. The paper reconstructs Ernst Antevs’ New England Varve Chronology, calibrates the record, and matches it to climate events depicted by oxygen isotope records from Greenland ice cores. The updated chronology spans ~18,200-12,500 years before present and creates one of the most detailed deglacial chronologies anywhere in the world. This past year the paper won the Kurt Bryan Award from the GSA’s Quaternary and Geomorphology Division. For more information on the varve work and varve chronology, see our web site at: http://eos.tufts.edu/varves/default.asp

Over the last two years varve and paleomagnetic work has continued in middle Wisconsinan glacial lake beds in the Finger Lakes (w Dan Karig at Cornell) and late Wisconsinan units in the western Mohawk Valley and northern Hudson Valley regions of NY. I have also been a part of a group trying to create a record of cosmogenic isotope (10Be) fallout from glacial and postglacial varves in New England, although this effort has not met with immediate success because of some of the complexities of glacial varve deposition.

Although my work has focused on varves I’ve expanded into other areas and also incorporate my love of field mapping. I have taken on bedrock mapping in the Boston area that focuses on late Proterozoic igneous and metasedimentary rock stratigraphy of a part of the Avalon Terrane in the Middlesex Fells Reservation, the largest urban forest preserve in the US. This is a far cry from my usual geologic domain and the amount of petrology and structural geology I have learned would make Gary Boone proud! (Not bad for a sod buster!) It is amazingly convenient to be able to walk out your back door and start mapping! This project will attempt to create a cross-platform device app or web-based program with GPS capability, allowing hikers on trails to learn about the geology at designated waypoints in the preserve. This past summer, my students and I have also been studying saltmarsh cores from Boston Harbor in an attempt to establish a record of pollution and land surface disturbance. The peat cores preserve the history of coal and oil burning (magnetic susceptibility), nuclear tests and the Chernobyl accident (137Cs spikes), clearcutting around the harbor (changes in clay and silt input), hurricane overwash events and periods of heavy ice-rafting (sand beds), and some interesting heavy metal profiles.

I occasionally see other SU grads on field trips and at GSA meetings, most notably Dave Franz (SUNY Plattsburgh), Cheryl and Bob Marvinney (Maine Geol. Survey), and Anne Veeger (URI), but I also see Anne Gardulski every day. (She happens to be a colleague of mine at Tufts.) Jason Wang, who recently moved to California, keep myself busy with badminton and tennis. I joined a local badminton club, which greatly helps with my fitness in the winter. After not playing tennis for over 20 years I started up again about 5 years ago and am fit enough to start playing USTA tournaments. Of course, it will be in the 60 & over category!
Earth Science is a visual exploration of our world…
Here are some of the things we see.
EARTH’S SCIENCE is a visual exploration of our world...

Here are some of the things we see.
Can I trust Syracuse University professor paid by company for fracking study? (Your letters)

This picture of Chairman Don Siegel at an outcrop of the Marcellus shale, was published in the Syracuse Post-Standard along with a critical letter from an SU Junior.

Following is an article by Don:

Pat Bickford, our Newsletter Editor, asked me to write a piece about my recent experience doing science in the public arena. So here’s my story, along with some representative references. There are many more. Check out Google.

First some background: in the past few years I have participated (representing myself, not EAR or SU), in the debate over fracking for gas and oil. From the beginning of the controversy, I felt there would be minimal chance for groundwater contamination from modern hydrocarbon drilling. I based my intuitive view on my long-standing research experience and expertise on how fluids in the subsurface actually move and what happened to contaminants should they get into groundwater supplies.

I debated fracking opponents on water issues, and gave talks why people should not worry about water contamination related to fracking. I never promoted fracking, but did promote sound water science. Because of this, anti-fracking advocates, not unexpectedly, excoriated me in the blogosphere Perhaps they felt I was participating in some kind of pissing match, but if so, I don’t mind getting my feet wet for science. So what’s the big controversy over me?

A few years ago, scientists from Duke University published a paper in the Proceedings of the National Academy of Sciences wherein they argued, on the basis of a small set of water samples from domestic wells, that more dissolved methane occurs in ground water found close to gas wells. This paper garnered publicity as “evidence” for contamination from unconventional gas development. Arguably, the paper may have significantly contributed to New York State’s current ban on the practice.

But, when I read the paper, I noticed that many samples having high methane were located near a fracked well that was notorious for accidently contaminating ground water with gas. Since GPS coordinates for the data remained confidential (common in contaminant studies of all kinds because of homeowner concerns), I couldn’t exactly confirm my suspicions. But if they were true, the sampling protocol would have been analogous to measuring smoke near a known burning building, and then coming to the conclusion that an entire city was likely to burn.

Subsequently, Chesapeake Energy Corporation asked me if I would head up a project to reproduce the Duke study by using ~13,000 analyses of dissolved methane sampled from domestic wells in NE Pennsylvania. These water wells were nestled among ~800 gas wells. This data set is unprecedented in size and overall quality for any groundwater study I have seen. How could I not take the opportunity to scientifically explore it?

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In contrast to the Duke study, we found no relationship whatsoever between methane and distance to gas wells, and we published our results in Environmental Science and Technology (ES&T). After Science reported positively on our paper, web-based Inside Climate accused me of unethical non-disclosure and demanded an investigation. What was the disclosure “problem”?

I didn’t indicate in my conflict of interest statement that Chesapeake paid me one month of my professor’s summer salary for helping them (one third what I would have charged had I done it as consulting, and not as doing basic research).

Fracking opponents could not seriously challenge the science in our paper, since Chesapeake had statistically sampled the entire water well population, using long-accepted regulatory protocols that opponents of fracking themselves invoke when they argue for contamination.

So, opponents attacked me personally. ES&T prudently asked my colleagues and me for more details, and we provided the largest and most detailed disclosure statement I have ever written. Perhaps this statement can be used as a template for thoroughness on these kinds of things in the future.

The accusation went viral, such that the Committee of Science, Space and Technology of the U.S. House of Representatives called me to testify on the Hill. The Syracuse Post Standard ran three articles reporting on the accusation, spacing them a few days apart for impact, complete with a picture of me holding a piece of the Marcellus Shale (I include it above—it’s a good picture).

The Post Standard even highlighted a letter to
the editor written by an SU junior, who never offered the common courtesy of speaking with me before writing his inflammatory piece. Finally, Joe Heath, Attorney for The Onondaga Nation, sent a long legal brief to SU’s administration to try to get me to resign or be fired.

To their credit, neither SU nor ES&T found problems with my disclosure.

My disclosure issue led to a published essay by other earth scientists, who argued that earth science journals need a more intensive disclosure system to ferret out those who bias their research when funded by industry. But doesn’t this proposal imply that any science done by someone paid by industry necessarily should be suspect. How about science paid by non-profits with philosophical environmental leanings? They too can be “Merchants of Doubt” who refuse to set reasonable bars of scientific certainty acceptable to them. It works both ways.

Others in the scientific community tell me that poor science will, over time, be ferreted out through replication and testing. But, in courts and to the public, any paper published in the peer-reviewed system conveniently can be viewed as “gold-standard,” vetted, and correct, when the paper’s conclusions agree with their beliefs. I have seen this situation many time when I have testified in court in environmental litigation and have even written about how standards of proof differ between dispute resolution and academia.

Moreover, because of tenure and promotion pressure, and international submissions, the volume of papers now submitted to peer-reviewed journals has compromised the review process. Having served as an editor for many journals, I find many senior scientists recuse themselves from reviewing because they are “too busy”, and editors often have a difficult time getting sufficient numbers of reviews. So, authors can “game” the system knowing that some friends they suggest as reviewers probably will be asked to give them a review, particularly when publishing in second-tier, profit-driven journals, rather than societal journals like Geology and Science.

We should all find it unfortunate that opponents of issues involving science, engineering, and public policy resort to first sowing doubt, via publishing selective data to meet adversarial aims; and, if that doesn’t work, launching personal attacks as a means to achieve their desired ends.

Scientists who involve themselves in such practices may easily undermine public trust in science.

Michael G. and Susan T. Thonis Professor
Suzanne Baldwin

This past year I served on a National Science Foundation (NSF) appointed steering committee to assess opportunities and challenges for U.S. geochronology. We collected much of our data at workshops/town hall meetings, and at conferences, including the Goldschmidt Conference, the 14th International Conference on Thermochronology, and the annual meeting of the Geological Society of America. In March our seven-member delegation presented to NSF program managers the findings of our year long study of the role of geochronology in transformative geologic research, and how this research is funded in the U.S. Under consideration are instrumentation and facilities needed to support existing, and emerging research opportunities; collaborations among the government, industry, and higher education, as well as, the importance of training the next generation of geochronologists. The report identifies the shared goals of the national geochronology community and our vision for future geochronologic research that will benefit the broader Earth sciences community. With considerable expertise in sample preparation, analyses, and interpretation of geochronologic data, Syracuse University’s Earth Sciences department is poised to take advantage of future geochronologic funding initiatives. The report is available online, or feel free to contact me if you are interested in receiving a hard copy.


Modern Earth Science is fundamentally interdisciplinary and requires students to think about concepts on all scales- from planetary (km), to hand sample (cm) to microscopic (micron) scales. With generous funding provided by SU’s Science Education Excellence Fund, I spearheaded department efforts to incorporate a microscopy component into the introductory physical geology courses. This past year we were able to purchase an additional eleven petrographic microscopes, a projection system for use with the microscopes, and thin section
supplies for use in EAR labs. The addition of a microscopy component in the introductory labs will enable students to develop/strengthen their sense of scale—a skill that is especially important for earth science research.

On the research front, we are using the ultrahigh pressure (UHP) terrane of Papua New Guinea as a modern analogue for comparative studies of UHP terranes globally. While we continue to publish our results from Papua New Guinea, together with Marco Malusà (University of Milan), we have conducted fieldwork in the Western Alps, and Corsica. The first results of our collaborative study was published this year in G-cubed.


**Associate Professor Greg Hoke**

Now at the close of year 6, the Hoke research group is going strong. In late 2014 Prof. Hoke was awarded an EAGER (Early concept Grants for Exploratory Research) from NSF to test a new method for determining surface uplift rates using cosmogenic nuclides. Hoke and postdoctoral research associate Devin McPhillips traveled to Bolivia, Chile and Peru during the winter break to collect the samples. Over 2.5 weeks, 14 separate flight segments and 1800 miles of driving, they bagged 30 samples. The preliminary results from the project look promising. As part of the same project, we are working with Rob Moucha on applying the same approach to glacial isostatic adjustment. In June Rob and Greg went on a 1-week sampling campaign in James Bay, Canada.

Mallory Ringham (BS ‘13) can add another SU degree to her belt with the successful defense of her MS thesis on clumped isotope geothermometry in May 2015. Greg Wissink and Pedro Val are also making steady progress on completing their PhDs. Both have submitted manuscripts on their work to journals and plan to finish up this academic year. The entire group will present at the GSA national meeting and Pedro will present some of his research at the fall AGU. This fall incoming PhD student Jennifer Nair joins the group.

**Assistant Professor Rob Moucha**

My research group expanded this academic year: Ph.D. candidate Siobhan Campbell will focus her research on numerical modeling of mantle convection and joint seismic-geodynamic inversions in collaboration with Dr. Nathan Simmons (Lawrence Livermore National Labs). As a surprise to many, a geodynamicist can indeed venture out into the field (see photo for proof). This late spring, Greg Hoke and I travelled to Upper James Bay (Chisasibi, Quebec) to collect bedrock cores in an effort to validate a novel terrestrial cosmogenic nuclides method developed by Greg Hoke and Devin McPhillips that could be used to measure glacial isostatic uplift rates. Following the trip up North, I was invited to UC Berkeley for two weeks as a senior geodynamics advisor and lecturer to a number of students and postdocs at the 2015 CIDER summer workshop (www.deep-earth.org/summer15.shtml). It was a fantastic and successful workshop where my group and I worked on addressing the enigma of how to quickly drawdown atmospheric CO2 from a severe Hadean to form a habitable Archean. We hope to continue working on this project that couples geodynamics and geochemistry.

**Professor and Associate Dean Paul Fitzgerald:**

It has been an exceptionally full year as I have worked both as a faculty member in the department and as the Associate Dean for Science, Mathematics and Research in the College of Arts and Sciences. As Associate Dean it is satisfying to be able to help departments, faculty and students in their research endeavors and to work with the Dean and colleagues to craft the future direction of the college. Highlights last year included overseeing selections of proposals for the highly significant one million dollar Science Equipment Excellence Fund (SEEF), the objective of which was the purchase of new equipment essential to the teaching mission of (mostly) introductory science classes. We also received approval to hire two grant development officers in the college to facilitate grant writing, something that other universities and also other colleges at SU have shown works to increase proposal success. And, I was deeply involved in developing a memorandum of understanding with the College of Engineering and Computer Science to increase the sharing of resources and costs so that faculty and students are much better served through research infrastructure support. There is much to do to bring SU up to a level where we can reach our full research potential and I look forward to working with the Dean and administration to enhance the research infrastructure at SU.
We have had an especially busy summer in the fission track lab. Ana Lossada, a Ph.D. student from Argentina and Mateus Agostta, an undergraduate student intern from Brazil have been learning the fission track technique and preparing samples. Chili Shorten, PhD candidate, has also been working on her samples from the Northern Appalachian Basin. During the early summer, Professor Suzanne Baldwin and I undertook fieldwork in the Ligurian Alps in Italy and Corsica with our colleague Marco Malusa from the University of Milan. We are studying the exhumation of (U)HP rocks in the Alps, as there are many similarities with how (U)HP rocks are actively exhuming in eastern Papua New Guinea. Some of these similarities between the Alps and PNG are presented in a recent paper (Malusa et al., 2015 in G3) that details the tectonic control on exhumation of these (U)HP rocks, essentially by removal of the upper plate which is a result of changing plate motions. Marco and I were also asked to write/edit a book on fission track thermochronology and its application to geological problems, but more on that next year. The last part of the summer I will be in Alaska with colleagues, working along the Denali fault east of the Richardson Highway to test models for how strain partitioning and contrasting lithospheric strength profiles control deformation along strike-slip faults. In essence we are addressing questions raised in two papers on Alaskan tectonics that we published in the last year. Fitzgerald et al. (2014) used fault and terrane location, and the role of lithospheric strength contrasts to explain enigmatic patterns of uplift and exhumation and alternating topography in the Alaska Range. Riccio et al. (2014), also in Tectonics (and based on Steve Riccio’s MS thesis) constrained the timing of initiation of the Susitna Glacier thrust fault and the role of thrust faulting along the southern side of the Denali fault. I also put significant time this last year into developing an opportunity for our students to undertake an “earth-sciences focused” semester abroad in New Zealand, that also incorporates field camp, and this is presented elsewhere in this newsletter. With all of that and the usual conferences, all international this last year (GSA Annual Meeting in Vancouver, Canada, the 14th International Thermochronology Conference in Chamonix, France, and the 11th International Eclogite Conference in the Dominican Republic, it has been another fruitful year.

Professor Linda C. Ivany

Research continues in the Ivany lab with a dynamic group of grads and undergrads working on a range of projects (see also student write-ups). We welcome PhD student Emily Judd, interested in the distribution of paleoseasonality during the Eocene. The first part of Emily’s work builds upon that of Nicole Miklus (M.S. 2008) and explores how seasonality in Antarctica might be affected by changing precipitation regime and ocean circulation as the continent becomes glaciated. She is also mentoring undergraduate Claire Bearden on her senior thesis about paleoseasonality during the Pleistocene. Together with Daren McGregor, in the home stretch of his masters work on Cretaceous paleoseasonality, we are using the chemistry of fossil bivalves to reveal how seasonal temperature range, mean temperature, and gradients in these variables across latitude differ during some of Earth’s warmest climates and how they change with global cooling.

On the paleontological side, Ph.D. student David Moss has made great progress in his quest to understand the evolutionary and ecological underpinnings of extreme longevity in bivalves. Most recently, he coordinated a group of students including Emily and Claire, above, and undergraduates Patrick Cummings, Woo-Jun Kim, Emily Artruc, Jeremy Driscoll, and Betsy Hubbard to compile a systematic database of lifespan across all bivalve taxa, and finds that maximum lifespan is significantly higher toward the poles; tropical bivalves are almost universally fast growing and short-lived. Emily Artruc (ESF) is also working on her senior thesis to understand the life history of a very large and very strange ammonite from the Cretaceous of Antarctica. Diplomoceras looks like a 6 foot long paperclip, and we have no idea how long it lived, what it ate, or where it spent its time in the water column. Working also with Prof. Chris Junium, we hope to reveal some of its secrets using stable isotopes of carbon, oxygen, and nitrogen.

Aside from research, I continue to serve as Director of Undergraduate Studies for the Department and thoroughly enjoy my interactions with our majors as they progress toward their degrees. The most difficult – and most rewarding – part of the job is seeing really great people you’ve come to know over several years graduate and move on. In addition, I have finished
my term as President of the Board of Trustees for the Paleontological Research Institution and continue on as an emeritus trustee for that wonderful center of scientific research and education. Those of you returning to Central NY for a visit should check out their Museum of the Earth in Ithaca – a really neat place, and located quite close to another geological wonder, Taughannock Falls, a spectacular hanging valley and the highest waterfall east of the Rockies. This past year also brought a couple of nice surprises, with word that I’d been elected a Fellow of both the Paleontological Society and the Geological Society of America.

Assistant Professor Christopher Junium

This past year has been an excellent year by all accounts. First, my sincere congratulations need to go to my departing students. Kara Dennis, my first M.S. student, completed her course of study and defended her thesis this past April. Her work focused on assessing the fidelity of sulfur isotope signals during the peak of the middle Paleogene greenhouse. She has moved on to a lab manager position at Lamont Doherty Earth Observatory in Palisades, New York. Anthony Carrancejie (B.S., Earth Sciences) undertook a difficult senior research study to determine whether we could analyze trace organic matter retained in the skeleton of Devonian Rugose corals. Current students Vicky Wang and Ben Uveges continue their thesis work and are making fine progress. We have also welcomed two new undergraduates into the GAPP Lab, Alaina Hickey and Dannielle Pratt.

On the research front the big news comes from the awarding of two new grants from the National Science Foundation. I was lucky enough to receive an NSF-CAREER award through the Sedimentary Geology and Paleobiology program to continue work on the ancient nitrogen cycle. Specifically we are working to apply new methods we developed to allow us to access organic nitrogen and carbon in shells and skeletal carbonates. From here we can answer questions about how marine trophic ecology evolves through major environmental perturbations. CAREER awards also have a significant educational component. Here I will be engaging Onondaga Community College Students in a summer short course at our own Green Lake. I am also lucky to be a part of the EMPOWER program led by Laura Lautz. In both cases, these awards will be bringing a surge of new graduate students to our program and providing significant resources for research.

Professor Jeffrey Karson

Following a one-year leave, in June and July 2014 I ran an undergraduate research program with Rick Hazlett (Pomona) sponsored by the Keck Geology Consortium. Students did 2 weeks of fieldwork in Iceland followed by two weeks of lava flow experiments back at SU under the auspices of the SU Lava Project; (now with over 40M website hits). Along with MS students Keegan Runnals and James Proett we continued our investigations of faulting in Iceland sponsored by NSF. Both Keegan and James successfully defended their theses in May 2015. In September I returned to Iceland to join the first small group of investigators to visit the early stages of the Barabunga eruption at Holuhraun. This study was funded by a RAPID grant from NSF and is linked to the lava project. The highlight of the year was publication of my new book entitled “Discovering the Deep- A photographic atlas of the seafloor and oceanic crust” (Karson et al., 2015, Cambridge University Press). This is the first book to provide a comprehensive review of the geology and processes along the global mid-ocean ridge system. With over 500 color images, it is a compendium of stunning views seafloor processes, most of which have not been previously published. My co-authors and I hope that it will be useful as a reference for investigators and a textbook for upper-level classes.

Associate Professor Laura Lautz

The hydrology group at Syracuse has wrapped up another exciting year with many new developments. We continue to investigate the role of stream-groundwater interactions in glaciated catchments of the Peruvian Andes,
as well as advancing heat tracing methods in hydrologic systems and understanding potential impacts of hydraulic fracturing on water quality in the Marcellus shale. Continued work on water quality in urban streams, and the role of stream-groundwater exchange, is being led by Sarah Ledford, who will be wrapping up her Ph.D. this year. Sarah has been presenting her work at national conferences and publishing her findings in peer-reviewed journals. Her contributions have provided important insights on how floodplain connection in urban streams contributes to regulating water quality year round, particularly with regard to stream salinization due to deicers and nutrient dynamics.

Several group members wrapped up their programs at Syracuse and headed off to new positions this year. Ryan Gordon, PhD 2013, completed a 1-year postdoc in the department, studying how groundwater storage in alpine meadows contributes to sustaining streamflow in glaciated catchments of the Peruvian Andes, where glaciers are rapidly retreating in response to climate change. He is now a hydrogeologist with the Maine Geological Survey, working with Robert Marvinney (PhD 1986), the Bureau Director and Syracuse alum! Dylan Irvine completed a 1-year postdoctoral appointment, studying how heat tracing is best used to quantify rates of stream-groundwater exchange, and teaching Hydrogeology to department undergraduates and graduate students. Dylan is now in a postdoctoral appointment at Monash University, in his home country of Australia. Kayla Christian, MS 2015, completed her degree studying methane occurrence in domestic wells overlying the Marcellus shale in southern New York State. She took a position at SPEC LLC, in Albany, NY, where she works as an environmental consultant. Ryan, Dylan and Kayla made exceptional contributions to the hydrology program at Syracuse and will be missed.

Just as folks have moved on over the past year, our group has welcomed two new students in the graduate program this past year – Robin Glas and Emily Baker. Robin joined the department as a PhD student after spending several years teaching science at an international school in Argentina. Her passion for science and exceptional Spanish speaking skills are serving her well as she plans a challenging season of fieldwork in the Peruvian Andes using geophysical methods to characterize the structure and function of shallow alpine aquifers that discharge groundwater to proglacial streams. Emily is starting her MS degree program after graduating from Mount Holyoke College in 2015 with a degree in Geology. Emily will be using thermal camera imagery and stream energy balance modeling to quantify rates of stream-groundwater exchange at high spatial resolution in proglacial streams of the Peruvian Andes. As I finish this update, we are headed off for several weeks of challenging field work in Peru, joining department alums and collaborators Jeff McKenzie (PhD 2005), now at McGill University, and Bryan Mark (PhD 2001), now at OSU’s Byrd Polar Research Center.

When I return from fieldwork, my next challenge is starting up our recently funded National Science Foundation Research Traineeship (NRT) Program, titled the Educational Model Program on Water-Energy Research (or EMPOWER). The $3 million award will fund over 40 graduate students across Earth Sciences, Civil & Environmental Engineering, and the Maxwell School. This collaborative project includes other department faculty, including Chris Junium.

Professor of Interdisciplinary Science Cathryn Newton

Cathryn Newton has been appointed to the Office of the Provost as a Provost’s Faculty Fellow. In this role, she will work on philanthropy, large-scale campus planning, and large interdisciplinary academic programs. She has already been serving on the Chancellor’s Committee for the Campus Master Plan, a role in which she has proactively been gathering groups of faculty and staff to give input about the future of our campus. She is already integrally involved in conversations about and studies of many changes proposed in draft form by Sasaki Associates.

Assistant Professor
Zunli Lu

This year has been another wonderful time for my group. Xiaoli Zhou (PhD student) published her third paper at SU! And more to come soon!! With Kristina Gutchess transferring to be a PhD student, we continue to expand the usage of iodine in both global oceans and local rivers as an important tracer. Kristina will become one of the Water Fellow next year. After being an incredible TA and with this fellowship, she will be able to spend more time on her latest favorite toy (computer model) and to start writing up her work. Welcome to my new PhD student, Wanyi Lu, from Guangzhou China. Looks like Wanyi is keen on playing with delicate fossils and learning about recent climate events. Wait, it’s time to do another newsletter already? It means not much summer is left. I still got work to do... I mean, fishing.
If you were to examine almost any section of Paleozoic limestone in North America and measure the thickness and duration of deposition, you would conclude that accumulation occurred at a few tens of meters per million years, the average rate of subsidence of the margins of the North American craton. Conversely, if you cored Holocene deposits in an area of modern accumulation, such as the carbonate sediments of the Bahamian platform, and asked a similar question, you would decide that deposition occurred at rates on the order of a few meters per thousand years, which is the same as the rate of marine flooding of these regions during the melting of the last glacial ice sheet. These sorts of differences characterize sediment accumulation data from a wide range of depositional settings and imply that much or most of the time represented by an average section of shallow marine Paleozoic strata is therefore missing. Fully appreciating this nature of time partitioning between preserved sedimentary units and intervening horizons of stasis is confounded by the fact that at any single locality we can surmise that some periods of time are witness to accumulation, alternating with others that pass with no deposition (or even erosion of underlying units). But in truth, sedimentologists and stratigraphers have little data on the magnitude frequencies of these two stratigraphic repositories of geologic time. Collectively, what seems to be needed to more fully appreciate the nature of those complex and unsteady time series that result in sedimentary successions is an equivalent set of processes in which data on net amounts of change, durations of change, and durations of hiatal intervals between changes are readily available. For much of the past year, I have been developing the premise that Precipitation is Meteoric Sediment; that measures of meteoric precipitation may serve as an attractive analogue for systems characterized by unsteady, discontinuous sedimentation (or erosion). This is because abundant data exist at a variety of timescales (ranging from minutes to years) from a broad range of climatic settings (ranging from extremely arid to exceptionally humid), are readily available, and are easily accessible. Such data may afford an excellent referent for longer-term processes of deposition and erosion that can only be inferred from incomplete geologic data.

Over the past year, I have been working with Mario Cournoyer and John Iellamo on the crinoids from an exceptional assemblage of Upper Ordovician seafloor invertebrates from the Neuville Formation near Quebec City, Canada. This occurrence of early Paleozoic suspension feeders is truly exceptional because they occur on ‘hardground’ surfaces that formed during early marine cementation and lithification of small carbonate grains during an interval of low sedimentation. These organisms were then buried rapidly in relatively deep water by mudflows or distal turbidity currents that flowed down the basin slope. As such, many of the seafloor communities that existed in this area at this time yield highly informative assemblages of intact echinoderms that are preserved exactly where they lived.

These assemblages contain two passive suspension feeders, who caught microscopic plant and animal food particles from the surrounding water currents with small ‘tube feet’ that extended from their arms or similar structures. As is the case today, and as has been over most of the past 500 million years, suspension feeding niches are defined by a variety of factors including the mode by which the organisms were attached to their substrates, the elevations that the feeders attained above the seafloor, and the size of the food items that they caught and consumed.

One of the Quebec City suspension feeders is a crinoid (Ectenocrinus simplex for the aficionados) that had a small discoidal holdfast that was cemented directly onto the Ordovician hardground surface; their stem lengths suggest that the animals fed 20 to 50 mm above the hardground.
surface. The members of the other species (a ‘rhombiferan
cystoid’ named Cheirocystis anatiformis) lacked such
attachments, and a large part of their distal stems therefore
lay directly on the hardground, giving rise to an average
elevation of only 6 mm above the hardground. Judging
from the sizes of the food grooves and covering plates of
the crinoid and the brachiole grooves of the cystoid, the
latter caught considerably larger food particles. Inasmuch
as the two suspension feeders lived at different elevations
and largely ate different sized food items, it seems unlikely
that they competed for food and space. A third species that
lived on the hardground is an as yet undescribed species of
a group of echinoderms called ‘primitive solutan carpoids’
that are generally visualized as bottom dwellers that slowly
wandered over the seafloor. Their most likely feeding habits
comprise browsing on minute animals, plants, and organic
detritus on the seafloor; they were clearly ecologically
separate from the associated crinoids and cystoids. This
is all very exciting because this one small assemblage
conveys a great wealth of ecological information. Unique
occurrences as these can and should serve as key paradigms
for interpreting much of the fossil record. Certainly fun,
and I think important research.

Professor Emeritus and Research Professor M. E. (Pat)
Bickford

In last year’s Newsletter it was announced that
I was appointed “Coordinator for Space and Facilities”
in the College of Arts and Sciences (CAS). Much of my
time during the past year has been devoted to these duties.
I am mostly a liaison between Dean Karin Ruhlandt and
“CPDC” (Campus Planning, Design, and Construction).
I have attended construction meeting for renovations,
laboratory designs and constructions, and other space-
related matters. I have visited the chairs of all the CAS
departments, learning their space needs. And, I have
participated with other members of the Dean’s cabinet in
planning for future space needs in the College. The work
has been interesting, and I confess that I have enjoyed
being more-or-less useful and in the swing of things!

I have also continued research. In January I
published, with co-authors W. R. Van Schmus, K. E.
Karlstrom, P. A. Mueller, and G.D. Kamenov, a major
paper, “Mesoproterozoic-trans-Laurentian magmatism: A
synthesis of continent-wide age distributions, new SIMS
U-Pb ages, zircon saturation temperatures, and Hf and
Nd isotopic compositions” in the journal Precambrian
Research. This paper is, in many ways, a culmination of my
interest and research on the origin of the Mesoproterozoic
“Granite-Rhyolite” provinces that make up much of the
crystalline basement of the mid-continent region of North
America. Additionally I have continued my collaboration
with Dr. Abhijit Basu, Indiana University, on problems
in the Precambrian of India. In 2014 we published two
papers, one “Bickford, M. E., Basu, Abhijit, Kamenov, G.
D., Mueller, P. A., Patranabis-Deb, S., and Mukherjee, A.,
2014, Petrogenesis of 1000 Ma Felsic Tuffs, Chhattisgarh
and Indravati Basins, Bastar Craton, India: Geochemical
and Hf Isotope Constraints: in the Journal of Geology,
and a second “Basu, Abhijit, and Bickford, M. E., 2014,
An Alternate Perspective on the Opening and Closing of
the Intracratonic Purana Basins in Peninsular India: in
the Journal of the Geological Society of India. Basu and
I, in collaboration with Dr. Meenal Misra, are currently
processing two samples of rhyolite from the Vindhyan
Basin, in northern India, for zircons for dating.

And finally, I have received data from U-Pb
analysis of detrital zircons from the Pinal Schist, a
prominent unit in the Paleoproterozoic of Arizona. This
project, in collaboration with Prof, Kent Condie, New
Mexico Tech, should provide insights into what source
rocks were exposed during this critical period in the crustal
evolution of southern Laurentia.
STUDENT ACTIVITIES

Undergraduates
Alexis Ho-Liu

This summer of 2015, after finishing my freshman year as an Earth Sciences major, I was fortunate to be accepted to an internship program in the geosciences field. UNAVCO, a non-profit university-governed consortium that facilitates geodetic research, launched a pilot internship program designed to mentor first and second year students with research-ready skills. As an intern, I assisted and facilitated polar and glacial research using GPS as a mapping and surveying tool. My work ranged from mapping glaciers at high elevations to creating 3-D models of terrain using Terrestrial Laser Scanning (LiDAR.) As part of our investigation, we hiked a glacier called St. Mary’s, located in Colorado, to carry out different real-time and post-processing data survey/mapping methods around the perimeter of the glacier. After the project, we collected our data and got the chance to present at a poster session. Our work aims to give an insight as to what are the more effective ways to track glacial change over time. Other tasks during the internship included assembling campaign kits with equipment that was shipped to researchers in Greenland and Antarctica, testing and performing quality checks for GPS receivers, and managing warehouse inventory. An experience like this definitely solidified my interest and plans to pursue a career in the geosciences!

Adam Belkadi

I am currently a senior undergraduate in the department. This past year I joined the Thermochronology and Tectonics group, working under Professor Baldwin. This spring I learned how to prepare samples to be irradiated for 40Ar/39Ar dating. From rock crushing, to mineral separation, to preparing a package for irradiation, I was able to learn how samples are properly prepared for step-heating experiments. The samples I have worked on include rocks from Papua New Guinea, Italy, and Corsica. I spent the summer in the lab with the group, furthering my understanding of techniques used in the mineral separation lab and the noble gas lab. I am also beginning to learn analytical procedures associated with experiments for sample dating. This coming fall I plan to develop my own research project and put to use the techniques and tools I’ve learned over the past year.

Graduate Students

Topping our news from graduate students is the following achievement by Ph. D. Candidate David Moss

The National Association of Geoscience Teachers has recognized David Moss (PhD Candidate) as an Outstanding Teaching Assistant for 2015. He was cited particularly for his dedication, skill, commitment to excellence, and ability to engage students in the subject matter. The NAGT is committed to improving geoscience teaching and student learning, and recognize that graduate teaching is an important part of that equation. David’s goal is an academic position at a teaching college where he can focus on undergraduate education and involve students in his paleontological research projects.

David has also given us this account of his research activities:

My PhD research centers around the environmental and ecological controls on lifespan in bivalves, the group...
that contains some of the longest-lived species on the planet (507 years!), and how lifespan might evolve over time. The focus of my work this summer has been to document the latitudinal distribution of lifespans and growth rates in modern marine bivalves. In order to do so, the entire paleontology lab group completed exhaustive searches of over 30 journals that resulted in a database of over 1,000 entries. Until this effort, the only other compilation of this type, aside from anecdotal observations, included approximately only 50 entries. Our initial results show consistently short lifespans and fast growth in low latitude bivalves but much higher maximum lifespans, slower growth, and greater variability at high latitudes. These observations suggest a role for some combination of temperature and/or availability of food resources (via seasonal light limitation of photosynthesis) in promoting extreme longevity. To distinguish between the influence of temperature and food, variables tied together in modern settings, I turned to the fossil record and examined Eocene bivalves from Seymour Island, Antarctica— a high-paleolatitude, but warm, setting. Annual growth bands in these species are remarkably well preserved (see image below) and several unrelated taxa show impressive longevities (i.e., >50 years). The presence of these geriatric fossil organisms in this unique and non-analog location suggests that it is the high latitude, not the just cold temperature, that can promote long life. One possible mechanistic explanation may be the beneficial effects of a lowered metabolic rate through long periods of caloric restriction brought about by seasonal darkness.

Above: Growth bands in Lahilia larsensi from the Cretaceous of Seymour Island, Antarctica. Couplet of light and dark band represents one year of growth.

Emily Baker
I am a new Masters student in Laura Lautz’s lab, and I am excited for my first semester in the Syracuse Earth Sciences Department. This past summer I had my first field season, in which I spent a month in Peru collecting data to improve understanding of the hydrologic dynamics of this proglacial region. My research site was the Quilcayhuanca River in the Cordillera Blanca. We deployed in-stream temperature sensors that monitored stream temperature over an approximately 1.2 km reach for six days. We placed a ground based infrared camera on the valley wall 96 m above the valley floor that collected over 700 IR images of the stream and surrounding valley. Additional temperature sensors were placed throughout the valley to serve as control points for the infrared images. We also set up a weather station in the valley to record climate data during this same period. I plan to use these data as input for a spatial and temporal energy balance model of the reach.

While in Peru I also had the opportunity to help Robin Glas with her Ph.D. research conducting seismic refraction surveys, hike up to the terminus of the Yanamarey glacier, and camp at high altitude beneath the rugged peaks of the Andes. Back in the town of Huaraz, I tried Peruvian foods, including lomo saltado and aji de gallina, and learned words such as “combo”, which means sledgehammer, as we shopped for the additional pieces of field equipment that we needed. I am looking forward to returning to Peru next summer to continue my research.

I am eager to begin working with the data that I have already collected and excited for my first semester in the department.

Anthony Fiorentino II
I am a 2nd semester masters student studying the physical, electrical, and thermal properties of wetlands sediments, notably deposits from the prairie potholes in the glaciated Missouri Couteau region of North Dakota. Last March Zeno Levy and I flew out to the Northern Prairie Wildlife Research Center on the outskirts of Jamestown, North Dakota to collect several sediment cores though nearly 1.0 meter of ice! However, we were graced with seasonably high temperatures and sunny skies that enabled Zeno and me to collect 48 cores, using a variety of devices in order better to understand the complex relationships of the wetlands soils. The core samples were then driven all the way from North Dakota to the SU Earth Science department, where we are currently processing each core and gathering mounds of data!
Anthony is also an accomplished photographer. Below is his spectacular photo of the Matterhorn in Switzerland!

**Mariana Bonich**

I am currently in my final year of my Ph.D., and I am working in some new and exciting areas. For the past three years I have been working with Dr. Scott Samson and Dr. Chris Fedo (University of Tennessee, Knoxville) in southeast California on a phenomenon we are calling the “Stepladder Effect”. Essentially, there is a lack of one-to-one correlation between a granitic source and the sediment that lies directly on the source. This is the case both for trace element geochemistry and for zircon age patterns (i.e. the detrital zircon age spectra have very different proportion of ages that of the granite). To understand this perplexing problem we are going to compare the isotopic characteristics of detrital apatite with apatite from the granite. First I will determine U-Th/He cooling ages of single apatite grains followed by measuring the Sr isotopic composition of the same grain — something no one has done previously. I will do the thermochronologic part of the experiment at the University of Colorado and then make the Sr measurements at SU using the brand new thermal ionization mass spectrometer.

I was lucky enough to receive a NSF grant, through the EarthScope AGeS Program, to go to the University of Colorado to learn how to perform U-Th/He apatite thermochronology. This EarthScope Program was created to promote collaboration among different universities, faculty and students with the goal of training students in chronological techniques other than those they were already pursuing. The grant made it possible for me to go to Colorado to work with Dr. Becky Flowers and Dr. Jim Metcalf (a former SU post-doc!). Given the very large number of applicants and the very few grants available it was an honor and a privilege to have our project selected for an award.

I think our work is innovative and will shed new light on provenance analysis. I am very excited to see what our results will be!

**Christina Gutchess**

I joined the department in spring of 2014 as a M.S. student working with Zunli Lu using halogens as a tracer to distinguish among sources of salinity in the Tioughnioga River. After spending several months as a member of the department I chose to switch to the Ph.D. track instead. In March 2015 I attended the Northeastern section of the Geological Society of America meeting in Bretton Woods, New Hampshire, and delivered an oral presentation. I have completed the sample analysis for this project on IC and ICP-MS as well as the addition of water isotope data for a number of samples.

My research uses halogens as a sensitive tracer to identify sources of salinity and as indicators of the influence of groundwater in the Tioughnioga River. My study area is located in Central New York and comprises the headwaters of the Tioughnioga River - a major tributary to the Susquehanna River and Chesapeake Bay. The chemistry of the rivers suggests that different sources may be contributing to the concentrations of halogens that we see both temporally and spatially. I have most recently begun working with my data on a multivariate statistical model developed by Laura Lautz to classify water samples based on sources of high salinity.

**Sarah Ledford**

I completed the fourth year of my Ph.D. this past year, and during that time I focused on creating a groundwater model that simulates chloride movement in urban floodplains. My previous field research found that groundwater discharge into an urban stream helped to buffer annual chloride variations (Ledford, S.H. and L.K. Lautz, 2015. Floodplain connection buffers seasonal changes in urban stream water quality. Hydrological Processes 29(6) ). This buffering results from elevated chloride concentrations in groundwater and large annual variation in the incoming surface water. In the summer, as water flows along the connected reach, discharging groundwater with high chloride concentration increases the concentration in the stream. In the winter, the incoming surface water has higher concentrations, and the discharge of the now relatively low concentration groundwater reduces stream chloride concentrations. Over all, this results in smaller annual variations in chloride concentration in the stream water. I created a simple groundwater model to try and determine the governing processes controlling chloride concentrations in groundwater. I used Visual MODFLOW and MT3D to create a one-year model, and it was calibrated to three different sets of field data: chloride concentrations in the floodplain, groundwater discharge along the reach, and the water table slope.
I am in the process of writing this paper up for submission, then I need to write my third paper on different sources and sinks of nitrate in an urban stream. I hope to graduate in December 2015, so if anyone is looking to hire someone interested in urban stream water quality, please let me know!

Vicky Wang

I am a Master’s student working with Dr. Christopher Junium. My thesis work is an investigation of isotopic signatures in organic matter and pyrite of the Franceville Basin, Gabon (2.1 Ga) to better constrain changes in redox conditions and biogeochemical cycling after the initial rise in Great Oxidation Event (GOE, 2.47-2.32 Ga).

Paleoproterozoic sediments record the protracted history of rising and fluctuating O2 over hundreds of millions of years following the GOE. Marine sediments of the Franceville Basin, a large foreland basin within the Congo Craton of western equatorial Africa, are only lightly metamorphosed, with no signs of hydrothermal alteration, and their geochemistry may thus reveal unique insights into environmental and metabolic conditions during this transition. So far we have analyzed several biologically mediated redox proxies preserved in sedimentary carbonates from the Franceville Basin, including δ34S values of pyrite and δ13C and δ15N values of organic matter. We have also measured iodine/calcium in the samples to obtain a first order indication of the redox state of the Franceville Basin.

The δ13Corg values we have obtained can be paired with a previously reported δ13Ccarb record for these samples to test whether local methanotrophy or a global carbon cycle perturbation is the underlying cause of a negative isotope excursion in the Franceville Basin. The nitrogen isotope record of the early Proterozoic is sparse. I will use the δ15N data to interrogate links between carbon and nitrogen cycling in the Franceville Basin. If primary biogenic signatures are preserved in the Franceville Basin, I expect δ34S values of pyrite to vary in response to changes in carbon cycling and redox conditions.

The samples for my thesis work were generously provided by Alain Préat of the Free University of Belgium. Many thanks to the Ploger Fund and a fellowship in Summer 2014 from the College of Arts and Sciences for supporting my research.

Chilisa Shorten

I am a Ph.D. candidate working with Dr. Paul Fitzgerald. My research focuses on the thermal history of the Northern Appalachian Basin, constrained through low-temperature thermochronology. I am applying apatite fission track thermochronology to Devonian sandstone samples in order to determine the tectonic evolution of the basin since deposition. Low temperature thermochronology can provide valuable insight on the thermal history, tectonics and landscape evolution of many different geologic features and hence provide constraints on fundamental geological processes forming these features. Understanding the thermal history of sedimentary basins is important on a fundamental level to expand our base of knowledge as well as to determine potential hydrocarbon generation zones.

Last summer I collected 50 Devonian sandstone outcrop samples along the NY-PA border. These samples span across the Northern Appalachian Basin and are linked to basin-wide cross-sections. This summer I have been working on separating out theapatite grains and preparing grain mounts from the collected samples. I plan to send samples out for irradiation later this summer and will begin apatite fission track analysis in the fall.

I am fortunate to have received an award from the K.D. Nelson Research Fund for outstanding graduate research in geophysics and tectonics. With this award and several other grants I received the previous year, I have been able to employ Sara McNamara to assist with rock crushing and mineral separation during the school year. During this summer, Mateus Agostta is conducting an internship with Paul Fitzgerald in order to learn about apatite fission track thermochronology. Mateus is also working closely with me to learn mineral separation procedures and identification of fission tracks to determine his zeta calibration factor. I am grateful to Sara and Mateus for their eagerness to learn mineral separation procedures and their assistance in the laboratory. I am looking forward to completing my sample preparation and beginning apatite fission track analysis in the fall.

Benjamin Uveges

I have spent much of the last year continuing my tireless quest for geologic porphyrins from the Late Devonian, specifically from the strata encompassing the Frasnian-Famennian Biotic Crisis. While I have some samples that have yielded some very interesting Nitrogen isotope data for the extinction interval (fairly low and negative values similar to some OAE intervals), I am still searching for samples with a collection of porphyrins in them in order to perform biomarker, and compound specific isotope analyses. These analyses have the potential to help characterize the bulk input of biomass to the Late Devonian Appalachian Basin, and be further used to help constrain some of the conditions surrounding the FF biotic crisis.

With this goal in mind I will be heading out to Southern Indiana this summer to try and find sections correlated to those I have sampled in upstate New York, but that have been subjected to less heat and pressure, and therefore are more likely to retain organic matter.

Since the last newsletter I have also presented at
my first AGU in San Francisco, Co-Headed our yearly student symposium (go to the SUES website for more details!) and passed my PhD qualifying exam in May, so it’s been a busy year so far!

*Pedro Val*

I am currently in the process of writing papers for publishing in peer-reviewed scientific journals. I have a paper in between reviews and at least two others in line to get started soon. The paper I am working on now reveals the existence of time-lags in the erosional response of catchments to changes in rock uplift. This is important for our understanding of the landscape evolution of mountainous landscapes that experience deformation and subsequent erosion. The fact that I have enough data (and more to come this summer) to complete my dissertation by next spring is due to the financial support I have received through two John J. Prucha awards (2013, 2014) from the SUES dept. I am grateful for the funding I have received and for the amount of research it allowed me to do. My strong effort to keep productive has been recognized by the SUES dept. this year in the form of the Newton E. Chute award, another reflection of the support and incentive the dept. has given me. I can’t be happier with my PhD experience here.

*Greg Wissink*

My research principally focuses on detrital provenance using U/Pb ages of zircons. I recently submitted a paper titled “Seeing through overwhelming sources in detrital zircons age populations” to EPSL which address problems associated with zircon datasets in which a single, multimodal population limits the resolvability of standard provenance methodology. To highlight obscured variation within the detrital populations, we systematically remove ages attributed to the dominating source. Subsequent population comparison significantly improve at distinguishing possible contributing sources from non-contributors. From there we mix potential contributing sources to maximize the similarity between original sample and mixed source populations to recreate our sample. We demonstrate in our paper, given the synthetic dataset we used to test the model, that 93% of all sources identified were correct components of our original sample with just 7% incorrectly identified, a significant improvement from when no removal was used (83% and 17%, respectively). We have applied this methodology to Yangtze River sediment data and have shown with some certainty that the upper reaches of the Yangtze catchment contribute considerably more zircons to the sediment of the Yangtze, suggesting higher erosion rates off the Southeastern margin of the Tibetan Plateau. This method has great potential to enhance our ability to find and examine subtle variations within large detrital datasets as well as understand how

source populations are mixing. This is particularly important when dealing with sandstone deposits as we cannot constrain their extents of their catchments and cannot easily constrain which sources more likely than others to be contributors.

*Siobhan Campbell*

I have just completed my first year of graduate studies in the department, working with Dr. Rob Moucha. I am interested in the effects of mantle convection on earth’s surface, and I am currently investigating the contribution of dynamic topography to the paleobathymetry of the equatorial Pacific. This summer, I am working in Lawrence Livermore National Laboratory, involved in a project on improving earth models, through the use of joint seismic-geodynamic modeling. While I am interested in using this within my geodynamics research, such models are also used for seismic event (either earthquake- or explosion-source) monitoring

*Zeno Levy*

Hello newsletter readers! This was another great year, as I continue to live my dream of studying wetlands. It has been a blessing to be able to work in Siegel lab. For my Ph.D. research I am studying prairie “pothole” wetlands in North Dakota. Millions of small wetlands in the Prairie Pothole Region provide important habitat for amphibians and migratory birds. Recently, our NSF grant co-PIs at Ohio State and University of Minnesota have found that high concentrations of sulfide and dissolved organic carbon in the wetland pore-waters are able to abiotically reduce nitroaromatic pesticide compounds on the timescale of hours. The purpose of my dissertation is to explore how hydrologic processes could yield this powerful “chemical cocktail.” To this end, I am using a variety of methods from the hydrogeologist’s toolbox such as: conservative geochemical tracers, temperature to estimate pore-water flux rates in real time, and geophysics to estimate subsurface salinity distributions beneath the wetlands. We went on a very successful coring trip over frozen wetland ponds in March, and I passed my comprehensive exam in May. All in all, a productive and intellectually stimulating year.
### Undergraduate Degree Recipients

**Bachelor of Arts**
- Nicole Abrams
- Rachel Pretory
- Karolina Lubecka

**Bachelor of Science**
- Karin Abrahamson
- Celina Bridges
- Mary Bromfield
- Natalie Buch-Pancorbo
- Anthony Carrancijei
- John Kaczmarczyk IV
- Woo-Jun Kim
- Ross Salerno
- Zoe Schapira

**Minor**
- Mark Holloway

### Graduate Degree Recipients

**Master of Science**
- Kayla Christian
- Kara Dennis
- Robin Drucker
- James Proett
- Mallory Ringham
- Keegan Runnals
- Jeff Spradlin

**Doctor of Philosophy in Earth Sciences**
- Xuewei Zhang (December 2014)

### Departmental Awards

**Undergraduate Awards**
- **Faye E. Merriam Award**
  - John Andrew Kaczmarczyk IV
- **Thomas Cramer Hopkins Scholarship**
  - Claiore Elizabeth Bearden
- **Vincent E. McKelvey Scholarship**
  - Ross Anthony Salerno
- **Estwing Award**
  - Emily Jane Carey
  - Alaina N. Hickey

**Graduate Awards**
- **Newton E. Chute Award**
  - Pedro Fonseca de Almeida e Val
- **Marjorie Hooker Award**
  - Mallory Cecile Ringham
- **Chair’s Award**
  - Sarah Holderness Ledford
  - Keegan Timothy Runnals
- **K. Douglas Nelson Award**
  - Chilisa Marie Shorten
- **Student Publication Award**
  - Xiaoli Zhou

The Department of Earth Sciences congratulates all of our graduates (and their families) and award winners.
14 November
GSA 2015
Baltimore, Maryland, USA
Monday, November 2, 2015
7:00 pm to 10:00 pm
Syracuse University
Department of Earth Sciences
Private alumni reception:
Tir na nÓg Irish Bar & Grill
201 E. Pratt Street, 2nd floor
Baltimore, MD 21202
Visit our booth (#111) Campus Connexion
at the Baltimore
Convention Center

AGU FALL MEETING
San Francisco | 14 – 18 December 2015
Tuesday, December 15, 2015
8:30 pm to 9:30 pm
Syracuse University
Department of Earth Sciences
Private alumni reception at
Jillian’s @ Metreon
175 Fourth Street,
San Francisco, CA 94103
Stop by our booth (#5078) in the
Academic Showcase
at the Moscone Center