

Morton K. Blaustein Department of Earth & Planetary Sciences



Thomas W. N. Haine

Letter from the Morton K. Blaustein Chair

Welcome to the Spring 2015 edition of the Earth & Planetary Sciences Newsletter. In the last issue I wrote about the retirements of Bruce Marsh, John Ferry, and David Veblen after many years of outstanding service to E&PS. Since then, the process of departmental renewal and growth has begun in earnest. Here is a brief progress report:

First, it is a tremendous pleasure to welcome Drs. Sarah Hörst and Kevin Lewis as assistant professors in planetary sciences. Dr. Hörst is an expert in extra-terrestrial atmospheric chemistry. She studies the atmosphere of Saturn's big moon Titan, in particular, which is composed of exotic, complex, fascinating organic molecules. In her Olin Hall laboratory she performs experiments that simulate Titan's atmosphere; she also works on spacecraft missions to Saturn and Titan. Sarah is assisted by Dr. Chao He, a Blaustein postdoctoral fellow with interests in planetary atmospheric chemistry, who joined E&PS recently. New graduate student Ms. Xinting Yu also started work in Sarah's group last fall from the University of Science and Technology in China.

Dr. Lewis is an authority on planetary geophysics, including the large-scale properties of planetary lithospheres using magnetic, gravity, and topography observations. Kevin's main current focus is on Mars, however. He studies sedimentary processes and thinks about ancient martian climates. He is involved in the on-going NASA Curiosity rover mission to Mars which is exploring Gale crater. New observations reveal a more active martian climate and surface environment than previously known,

and shed light on ancient martian hydrology.

Second, E&PS welcomed several new graduate students and postdocs last Fall. In addition to the people mentioned above, Ms. Nikki Deluca joined Dr. Naomi Levin's group with interests in geochemistry; Ms. Asha Jordan is working with Dr. Ben Zaitchik after graduating from Bucknell in Environmental Studies; Ms. Jamie Miller started work with Dr. Dimitri Sverjensky and plans to study biogeochemistry and astrobiology; Dr. Debjani Ghatak, an expert on land/atmosphere/cryosphere interactions, joined Dr. Ben Zaitchik's group, and Dr. William Seviour arrived from Oxford to work with Dr. Darryn Waugh on stratospheric ozone in Antarctica.

Finally, we are actively seeking new faculty. As I write, two searches are at advanced stages. The first targets quantitative geomorphology, volcanology, tectonics and dynamics, petrology and mineralogy, critical-zone science, and studies of the early Earth. Ideal candidates will complement the research of our current faculty and conduct geologic field studies (see below for recent news on E&PS field work). The second search is for a Bloomberg Distinguished Professor in exoplanetary sciences. The appointment will be made simultaneously

in E&PS and the Department of Physics and Astronomy. We seek someone to catalyze the university's research portfolio and reputation in exoplanets. The proximity of the Space Telescope Sciences Institute and the Applied Physics Laboratory, among other nearby institutions, makes Hopkins a particularly attractive place to study this hot field.

I anticipate that this renewal and growth will continue. Since the last newsletter, the department has undergone three external reviews of our academic and scholarly programs by distinguished experts from other Hopkins departments and similar departments in other universities. The review process is not yet complete, but I can share that our department enjoys a prestigious reputation. The reviews concur that the department consists of wonderfully talented faculty and students. And it commands a bright future for continued discovery and leadership in earth and planetary sciences.

With best wishes,

Thomas W. N. Haine

Welcome Two New Faculty Members

The department welcomes Assistant Professor Sarah Hörst (PhD in Planetary Sciences from the University of Arizona) and Assistant Professor Kevin Lewis (PhD in Planetary Sciences from the California Institute of Technology).



Sarah Hörst



Kevin Lewis

Welcome New Graduate Students

We also welcome the following new graduate students and postdoctoral students.



Nicole DeLuca



Asha Jordan



Jamie Miller



Xingting Yu



Debjani Ghatak



Chao He



William Seviour



Professor Cindy Parker Writes about Climate Change in *Arts & Sciences Magazine*

Cindy Parker, MD, MPH, director of the Krieger School's Global Environmental Change and Sustainability Program, and Raychel Santo, a 2013 graduate who majored in GECS, explore the impact of climate change on health in this article from the Fall 2014 issue of the Krieger School's *Arts & Sciences* magazine.

<http://krieger.jhu.edu/magazine/2014/10/confront-climate-change-now/>



Camp Singewald Damaged by Flood

Late last summer, Camp Singewald—a camp used by the department for field work—suffered major flood damage. More than 5 inches of rain fell in just a few hours, damaging structures throughout the town of Clear Spring and causing recommended evacuations along the Conococheague Creek. As a result of the flooding, then Governor O'Malley declared a state of emergency for Washington County. At the camp, the stream took its turn as a raging torrent that swept away the wooden footbridge and undermined the outhouse. A rapidly deposited debris and gravel dam forced the stream out of its bank, where it scoured the parking area and road all the way to the second run. As a result, the camp is closed until repairs are made. We have been talking with local excavators with the hope that we can reopen the original channel and restore the road, but that is still in the planning stages. The good news is that the water missed the cabin and other major buildings, so once we work out access, things will be up and running again. In addition, we have a property management company caring for the camp and have implemented new entry and usage procedures. More information to come when the camp reopens. We hope to have it ready by May and will email those who use the camp as soon as it's ready.

Some of the flooding damage at the camp.

Graduate Students in the Field

Thanks to our generous donors, we are able to offer our graduate students field research opportunities. We solicit proposals from students on an annual basis and award funding based on the research requests. Following are brief summaries from the graduate students who received funding this past summer.



Kirby Runyon

Kirby Runyon, **2nd year Graduate Student** **Advisor: Bruce Marsh/Nathan Bridges**

Kirby received funding to support his summer research through the David Elliott Memorial Fund. "Doing graduate work in geology even though I majored in physics as an undergraduate left strategic gaps in my geo-knowledge. I was able to use the summer field work fund to attend a five-week immersive field geology camp sponsored in the Black Hills by the South Dakota School of Mines. Most days involved mapping various geologic provinces, with time at our lodge spent drawing up maps and geologic cross sections."

Xu Yang, 1st year Graduate Student **Advisor: Kathy Szlavecz**

Xu received funding to support his summer research through the Mossom Fieldwork Fund. "To understand the response of the soil system to climate change and focusing on changing precipitation patterns, I did field work to quantify soil CO₂ flux under different drying-wetting cycles.

My study site was the upland forest of the Smithsonian Environmental Research Center (SERC) in Edgewater, MD. SERC is an ideal natural laboratory for studying forest carbon cycles because the vegetation and land history is known to great detail and is representative of the Mid-Atlantic region and because a wealth of historical and background data are available. To assess the below-ground responses to changes in amount and/or intensity of rain, we set up a series of rain manipulation experiments. Four such rainout shelters have already been built, and we built an additional two shelters as shown from in Figure 1 below. Also, in order to understand soil moisture's effect on soil respiration, we measured soil respiration under different moisture regimes. From mid-May until late August, we went to the field once or twice every a week to measure soil CO₂ flux and soil temperature and moisture at the same time."



Rainout shelters built during summer . (Inset) Xu Yang collecting soil moisture data.



Sophie Lehmann



Field Assistant is hunting for modern bones of small herbivores that lived on the rocks (granite) - like tortoises and rodents. These were then prepared at the University of Cape Town.



University of Cape Town, South Africa

Sophie Lehmann, 3rd year Graduate Student Advisor: Naomi Levin

Sophie received funding to support her summer research through the Palmer Field Work Fund. "My research is related to the vegetation and environments of Southern Africa over the past five million years. This is a period of time of major global climate change, when Earth's climate changed from a warm, more stable climate, into a colder, more variable climate, and witnessed the initiation of glacial and interglacial cycles. Our team is interested in understanding how regional terrestrial environments and ecosystems responded to global climate change. I use carbon and oxygen isotopes preserved in fossil tooth enamel to better understand vegetation distribution and climate during the past five million years and I use strontium isotopes preserved in tooth enamel to determine how animals moved around the region to search for nutritional food resources."



Haunting Hu pointing to the K/T boundary

Huanning Hu, 3rd year Graduate Student Advisor: Ben Passey

Huanning Hu received funding to support her summer research through the Williams Fund. "Located within the Umbria-Marche Basin, Urbino provides excellent field access to regional stratigraphic records of the Mesozoic and Cenozoic paleoclimatic history and events. The region includes numerous exceptional outcrops, such as the K/T boundary, both of the major Cretaceous oceanic anoxic events, and the Paleocene-Eocene Thermal Maximum. Field sampling, laboratory analysis and data collection will allow us to produce original data across intervals marking the evolution of Cretaceous and Cenozoic climates."

Chih-Han Chang, 5th year Graduate Student Advisor: Kathy Szlavecz

Chih-Han Chang received funding to support his summer research through the Robert Balk Fellowship Fund.

"My PhD thesis is focused on interspecific competition and facilitation among invasive earthworms, and the effects of these interactions on soil C cycling via organic matter translocation and transformation and microbial community modification. I conducted a two-year field experiment in which I manipulated earthworm species compositions in a forest plot at the Smithsonian Environmental

Research Center in Maryland, and a laboratory mesocosm experiment with field-collected soil and earthworm materials to complement the fieldwork. Decreases in soil biodiversity have been suggested to have strong negative effects on ecosystem functions, and invasive soil organisms are one of the major players responsible for these impacts. However, it is poorly understood how soil fauna biodiversity and food web structure are affected by earthworm invasion. My field experiment was designed to address this question. In the field,

I also produced ¹³C-enriched tulip poplar leaf litter and used it in the laboratory experiment to trace C from leaf litter into earthworm tissues, soils and soil CO₂ efflux, which were complemented by multiple soil CO₂ emission measurements and phospholipid fatty acid analysis to address changes in soil respiration and microbial community structures caused by earthworm activity and the associated C and N availability."

Undergraduate Field Trips



Conowingo Hydroelectric Dam

Lecturer Jerry Burgess arranged two field trips for students enrolled in the Energy Resources course. The first trip was to the Conowingo Hydroelectric Dam to examine its turbine power generation facility and to explore ecosystem consequences such as how the facilities fish ladder was designed to help the struggling Shad population. This trip supported and enhanced the department's learning objectives with regard to pros and cons of water powered facilities. The dam is an impoundment facility, and the students also saw a pumped storage facility all on the Susquehanna River.

Peach Bottom Nuclear Facility

The other field trip had students visiting the Peach Bottom Nuclear Facility to examine the details of nuclear power generation, maintenance, and waste storage issues. The trip supported the curriculum in a variety of ways such as giving students practical knowledge of reactor cores to discussing political issues surrounding homeland security and ultimate disposal of spent fuel. The boiling water reactor facility is one of the oldest in the US.



Smithsonian Environment Research Center (SERC)

Associate Research Professor, Kathy Szlavecz arranged a field trip for students enrolled in the Population and Community Ecology class. Last September, 31 students visited the Smithsonian Environmental Research Center (SERC) in Edgewater, MD. SERC lies at the land-water interface, and the class explored both types of ecosystems. In the morning they hiked through the upland forest and wetlands to learn about land-use history and the ongoing ecological experiments of the site. After lunch they took a canoe trip through Muddy Creek and the Rhode river estuary. The students learned about common marsh plants, wildlife, and the fish and water monitoring programs at SERC. From the water, the class had a better view of the SERC Global Climate Change marsh experiment that focuses on the effects of elevated CO₂ concentration and sea level rise on marsh carbon cycling.

Geological Sites in Maryland

Lecturer Amanda Charrier and Adjunct Assistant Research Scientist Thomas Wright arranged a field trip for students enrolled in the Freshman Seminar: Conversations with the Earth. In October the class went on a full day field trip to visit a variety of geologic sites in Maryland. The sites were in the Blue Ridge and Piedmont provinces, and included a boulder field remnant from Pleistocene (Ice Age) times, the thousand-foot high High Rock quartzite cliff overlooking the limestone-floored Great Valley, and an exposure of the 1.1 billion year old Baltimore Gneiss. Students learned about the formation and geologic history of the Maryland landscape in a class session earlier that week, and during the field trip were able to identify for themselves evidence of our geologic past.



Thanks to Our Donors

We are indebted to the following alumni, friends, and organizations for contributing to the Department from September 1, 2014 to December 31, 2014.



Lawrence Hardie

Earth & Planetary Department, Hardie Memorial Fund

Professor Lawrie Hardie devoted nearly 50 years of study in Earth and Planetary Sciences. He inspired many through his devotion to science, and we intend to permanently honor his achievements to secure and steward his legacy. In October, we sent out a solicitation hoping to establish a research infrastructure fund in Lawrie's memory. If you haven't already done so and you would like to donate, it's not too late. To date, the following have donated in memory of Lawrie's legacy:

Mary Barber, PhD

Steven E. Boyer, PhD

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Ms. Roxanne E. Yose

The following are donors who have contributed to various funds in the department:

Steven E. Boyer, PhD

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Zoe L. Longenecker-Wright

Please accept our apologies if we missed your name on the above list. Please let us know, and we will acknowledge your gift in the next newsletter. We are a small department. We remember all of our alumni, and we are grateful that, through your gifts, you still support and are interested in the department and its scholarly activities. Some of the things your gifts allow us to do are admit more graduate students, pay for student summer field and laboratory work, maintain Singewald Field Camp, and purchase equipment, teaching and research materials and equipment that are not covered by the department's operating budget. Your generous gifts make a significant difference to the Department of Earth & Planetary Sciences and we thank you.



Reminder to join/visit our LinkedIn group to instant updates and share news. You can find our page by searching The Morton K. Blaustein Department of Earth and Planetary Sciences at Johns Hopkins University.

Alumni Corner

If you have something you would like to share in the next edition, please provide us information by email to ktrent2@jhu.edu.

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