

February 2019 News Notes

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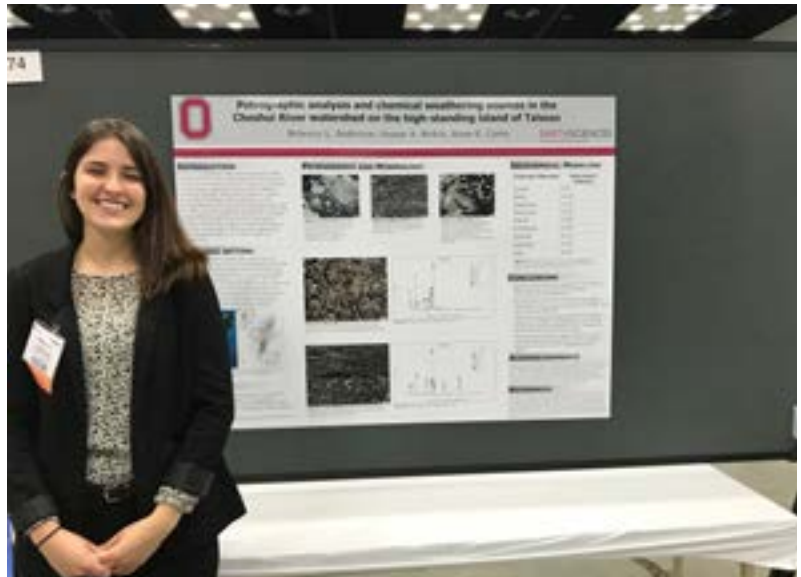
Alumni Change Lives

Becky Anderson is an undergraduate student at Ohio State working with Dr. Anne Carey. Here she describes how the Friends of Orton Hall fund helped her complete her undergraduate studies. If you are interested in giving to support the Friends of Orton Hall or other funds, please visit our giving page ([link](#)).

My research combines petrology, geochemistry and environmental geology to understand the connection between chemical weathering and the global carbon cycle. This project is a continuation of the research conducted by Kevin Meyer (M.S. 2017) on weathering patterns in the Choshui River of Taiwan. Taiwan is a prime location for studying both physical and chemical weathering because it experiences very high uplift rates and multiple typhoons every year. Chemical weathering of certain minerals,

specifically Ca and Mg silicates, is an important process because it serves as a carbon sink over geologic time. Kevin did a study on the dissolved solutes in the river in response to a typhoon impact, and while doing so he brought back 15 rock samples. The main control of solute chemistry is lithology, which is why I examined the rock samples in great depth to understand the source of weathering in this region of Taiwan. I used a petrographic microscope and XRD analysis to determine the mineralogy of the rock samples. I am also using geochemical modeling software to delineate the chemical weathering sources in the Choshui River.

The Friends of Orton Hall funding I received helped cover the cost of making the rock samples into thin sections, which was done by Spectrum Petrographics. I would not have been able to analyze the rock samples thoroughly without this crucial step. FOH allowed my research to start, and for that I am very thankful. After analyzing the rock samples and gathering data, I have had the opportunity to present my research multiple times and I am now writing my undergraduate thesis on this research project.



Becky Anderson at GSA

Professor Andréa Grottoli Elected President of the International Coral Reef Society

Professor [Andréa Grottoli](#) of the School of Earth Sciences was recently elected for a 4-year term as the President of the [International Coral Reef Society \(ICRS\)](#). Founded in 1980, the ICRS is a society to which reef scientists and managers from across the world belong. The mission of the organization is to further discovery and disseminate scientific findings about coral reefs, provide sound scientific information for policy makers, and to promote the conservation and global awareness of coral reefs.

The role of the ICRS has never been more important than it is today, as coral reefs are currently under stress from global climate change and local impacts, such as pollution and over-fishing. As President of the ICRS, Professor Grottoli will have the opportunity to work with researchers, policy makers, and community organizers for the betterment of coral reefs around the world.



Above: Professor Grottoli, President of the ICRS

Below: Prof. Grottoli demonstrates coral reef research in action



Durand's Group Estimates River Discharge from Aircraft

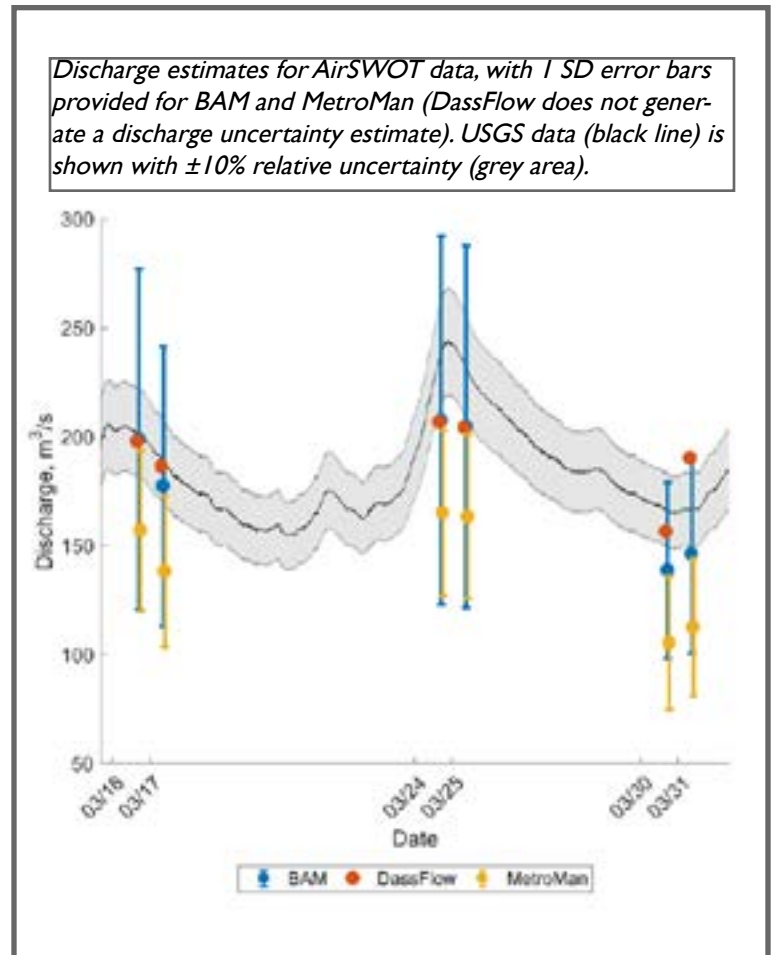
One goal of Dr. Michael Durand's "Measuring the Water Cycle" research group is to improve global estimates of river discharge by using remote sensing data to fill gaps in gaging networks. With currently available data, this is a hard problem: the satellite missions currently operating were not designed with rivers or lakes in mind, and as a result, it is incredibly challenging to estimate river flow using currently available data.

However, a possible remedy to this problem has appeared. New satellite datasets, like those anticipated from the forthcoming Surface Water and Ocean Topography (SWOT) mission, are expected to shift the fluvial remote sensing paradigm by providing high-accuracy and high-resolution data over the world's large rivers. SWOT will generate spatially continuous measurements of the water surface elevation and extent for global rivers using Ka-band radar interferometry.

In anticipation of SWOT, a number of river discharge algorithms have been developed and tested. These algorithms have, for the most part, been designed and tested using hydraulic model data. Still, they are largely untested on real-world remote sensing data, in large part because SWOT's measurements are so unique.

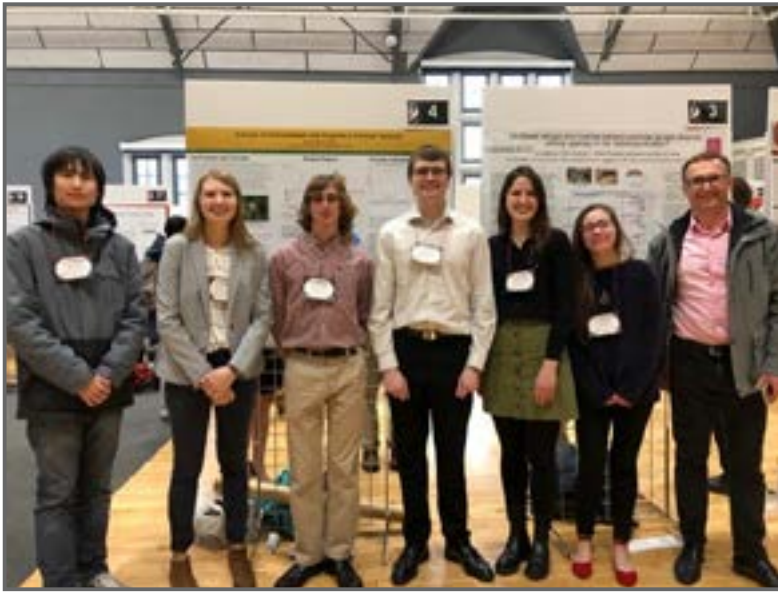
In a new study, Durand's research group evaluated three SWOT discharge algorithms on data collected from AirSWOT over the Willamette River in Oregon. AirSWOT is an airborne variant of SWOT which utilizes the same radar principles as SWOT (Ka-band swath altimetry using interferometric synthetic aperture radar) and operates at a similar spatial scale.

The group's discharge algorithm tests using AirSWOT data constitute the very first time that these discharge algorithms have been tested at the spatial scale of a SWOT reach using swath altimetry data, and the results were generally very encouraging. Errors fell in the range of 10-31% for the three tested algorithms. However, in the manuscript, the group highlighted important caveats to these results, including a strong sensitivity to a first-guess of the flow which the algorithms use as the sole 'a-priori' data in a scenario where no in-situ data is available.



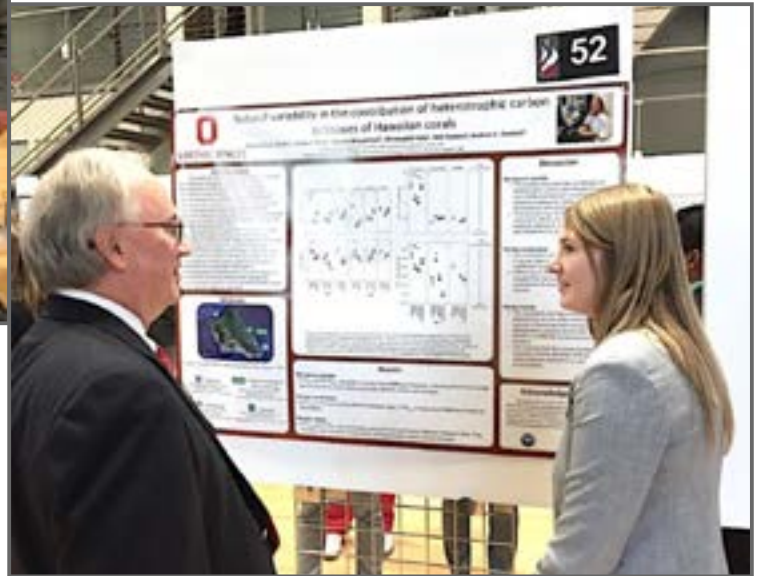
Above, a hydrograph with errorbars for the three tested algorithms is displayed: MetroMan (developed at OSU by Michael Durand), BAM (developed at UMass by Mark Hagemann, now a member of the Measuring the Water Cycle research group), and DassFlow (developed at multiple institutions in France by J. Monnier, P.A. Garambois, K. Larnier, and others). The algorithms capture the flow variability during the six AirSWOT overflights (bias-removed standard errors <10 % for all algorithms) but have substantial biases when compared with each other and the USGS gage-derived 'true' discharge.

Undergraduate Earth Sciences Seniors Present Thesis Research



From left to right: Wenbo Zhan, Alex Smith, Jonathan Bell, Prescott Vayda, Becky Anderson, Kira Eaton, and faculty advisor Dr. Loren Babcock

Below: Senior Alex Smith discusses her research with a forum attendee



Congratulations are in order for these six graduating seniors of the School of Earth Sciences, who presented their thesis research at the Denman Undergraduate Research Forum, Wednesday February 20th, in Pomerene Hall. The students set out their displays as part of the Evolutionary Ecology and Environmental Science (EEES) poster group. Their hard work did not go unrecognized: the first and second place prizes in the EEES group went to Becky Anderson and Prescott Vayda, respectively.

With the help of their faculty advisors, the seniors put forth an impressive array of research on a variety of topics. The titles of their presentations were as follows:

Wenbo Zhan (advised by Dr. Loren Babcock): Origin of carbonate sedimentation and concretions in some Paleozoic black shales

Alex Smith (advised by Dr. Andrea Grottoli): Natural variability in the contribution of heterotrophic carbon and nitrogen to tissues of Hawaiian corals

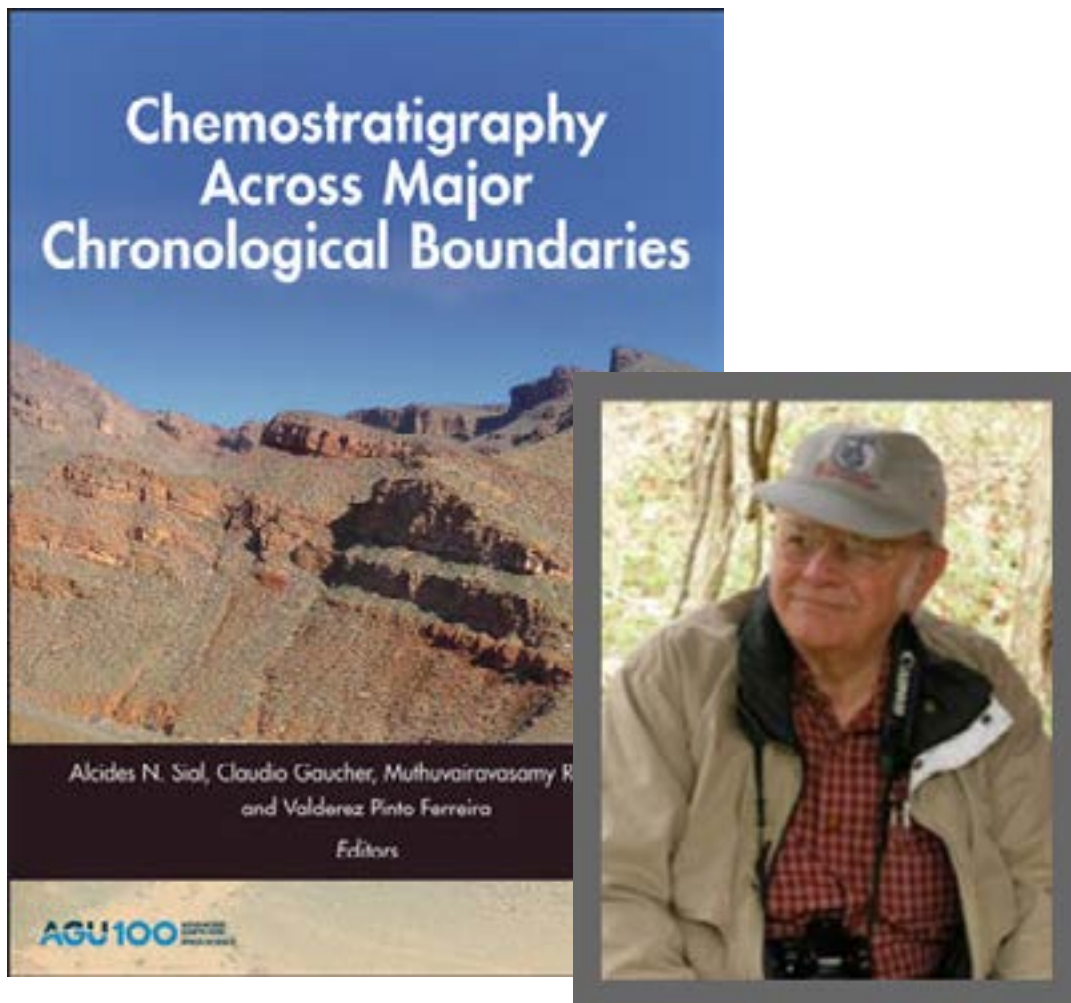
Jonathan Bell (advised by Dr. Audrey Sawyer): A study of groundwater and fluoride in central Tanzania

Prescott Vayda (advised by Dr. Loren Babcock): Application of x-ray computer tomography reveals a (fool's) gold mine of exceptionally preserved fossils in the Silica Shale (Devonian) of Ohio

Becky Anderson (advised by Dr. Anne Carey): Petrographic analysis and chemical weathering sources in the Choshui River watershed on the high-standing island of Taiwan

Prof. Stig M. Bergstrom Publishes a Contribution to a New Handbook on Chemostratigraphy

Chemostratigraphy has, in recent years, become a widely-used tool for local, regional, and even global correlations. A great deal of research in this field has been carried out by OSU faculty and students based on collections from many parts of the world. Recently, Professor Bergstrom, in cooperation with Professor Dan Goldman at the University of Dayton (formerly a post-doctoral researcher at OSU in the 1990s), published a chapter entitled “ $\delta^{13}\text{C}$ Chemostratigraphy of the Ordovician-Silurian Boundary Interval” in a 288-page handbook, entitled “Chemostratigraphy Across Major Chronological Boundaries”. The handbook is published by Wiley and Sons, Inc. in cooperation with the American Geophysical Union. Dr. Bergstrom and Dr. Goldman’s chapter deals not only with the chemostratigraphy of selected sections in Scotland, Sweden, China, the Canadian Arctic, and Siberia, but also includes discussions of glaciations as well as eustatic and faunal extinction events in the systemic boundary interval.



From left to right: “Chemostratigraphy Across Major Chronological Boundaries”; Professor Stig M. Bergstrom

ALUMNI SPOTLIGHT

DERRICK LAMPKIN

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WHERE HAS YOUR DEGREE TAKEN YOU?

I have participated in three research expeditions to Antarctica and Greenland, and conducted research on the west-central Greenland Ice Sheet in 2015. I have studied volcanic processes on the Moon and Mars while interning as a NASA funded researcher at the Center for Earth and Planetary Sciences, Smithsonian. I was a senior research scientist at the NASA Regional Earth Science Applications Center (RESAC) and the Center for Sustainability of semi-arid Hydrology and Riparian Areas (SAHRA). I also participated in the NASA sponsored Cold Lands Processes Field Experiments (CLPX), conducting field work in the Colorado Rockies. Additionally, I now lead the University of Maryland Ice Group and conduct NASA and NSF funded research on the large ice sheets.

HOW DID YOUR EXPERIENCE AS AN SES STUDENT PREPARE YOU FOR THE FUTURE?

OSU and the Department of Geological Sciences presented me with many lessons during my residency. I was rigorously trained in the department, and specifically at the Byrd Polar Research Center (BPRC). I owe a great debt of gratitude to the mentors and faculty who took an invested interest in my success. This includes Sue Shipley, Kenneth Jezek, the late Ian Whillans, William Ausich, Peter Webb, Larry Krissek, Hal Noltimier, Dr. Utgaard, and many others. I also experienced many challenges within the program as one of few African-American students. I was faced with unabashed racism and prejudice and those experiences taught me that I had the strength and tenacity to overcome ignorance and adversity.

MOST MEMORABLE EXPERIENCE AS AN SES STUDENT?

My sojourn with others from Byrd Surface Camp into the defunct Byrd sub-surface camp was an adventure of a lifetime. We were the first to enter this base under the ice since it was decommissioned in the late 1960's. It was an experience that is a hallmark of my life and I often tell this story in my classes and during talks. I still possess items extracted from this base as symbols of historic scientific exploration in Antarctica.

I would encourage young scholars to commit themselves to ethical behavior, and to respect the basic tenants of scientific inquiry and exploration by adhering to ethical practices.