

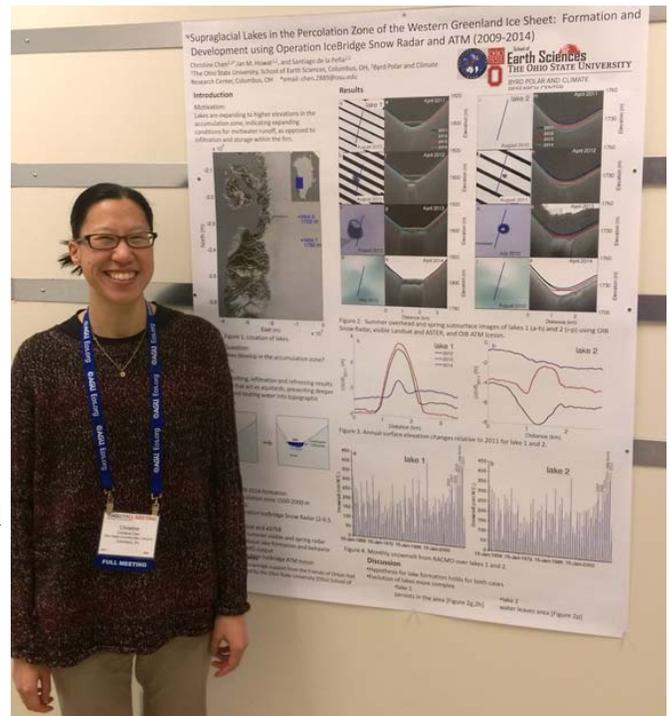
January 2016 News Notes

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Alumni Change Lives

Christine Chen is a graduate student working with Prof Ian Howat. Here she describes how the Friends of Orton Hall helped to advance her studies.

Concurrent with a rise in warming temperatures, supraglacial lakes have been expanding towards the interior of the Greenland ice sheet since ~2000. Their presence and progression within the percolation zone of Western Greenland are part of a larger story of how recent changes in the firn of the lower accumulation zone of Greenland are changing due to increased surface melt. I presented a poster on supraglacial lakes in the percolation zone of the Greenland ice sheet at the AGU annual meeting, which was held the week of December 14, 2015. The annual meeting is the largest geophysical conference in the world and runs the gamut over the Earth and Space sciences. As such, it's a great opportunity to hear, engage with, and be inspired by others within one's specialty. A few of my favorite highlights from the Cryosphere section include hearing a zany but passionate Richard Alley describe supraglacial lakes as upside down magma chambers, the thoughtfulness of Andrew Fountain in discussing what can be gleaned from borehole measurements considering neighboring measurements may influence each other, the intensity of Joe MacGregor in his approach to determine englacial temperatures of Greenland using various radar transects, and the cool carefulness exuded by both Regine Hock and Alex Gardner as they ambitiously gather and estimate worldwide measurements of glacier mass balance. It was also nice to hear updates on the Greenland aquifer and the brine discovered in the Dry Valleys of Antarctica. Participating in the poster session helped me to grow as a researcher. When colleagues stop by and raise questions, it helps me get a better understanding of how to do research, how they (who are typically more experienced) think, and how they approach research. Most people also likely ask questions from their own research experience, so it's interesting to note how people's backgrounds may influence what aspect they find interesting in my project. In addition to attending talks and presenting, I attended events held by the Earth Science Women's Network and Association of Polar Early Career Scientists, and caught up with friends both old and new. I am grateful for this experience, which would not have been possible without support from the Friends of Orton Hall.



January GEOS Update

Contributed by GEOS president, Mario Gutierrez. Happy Holidays and Happy New Year! The GEOS Student Chapter is coming off a strong 2015, and looking forward to a productive 2016. The spring semester will bring leadership elections, educational field trips, technical workshops, and professional development opportunities. Ohio State will be competing in the Imperial Award Competition, while the GEOS chapter will continue to integrate the geophysical aspects of SEG with our foundational AAPG base. We plan to also collaborate with other energy focused student organizations on campus, while also reaching out to our local professional community.

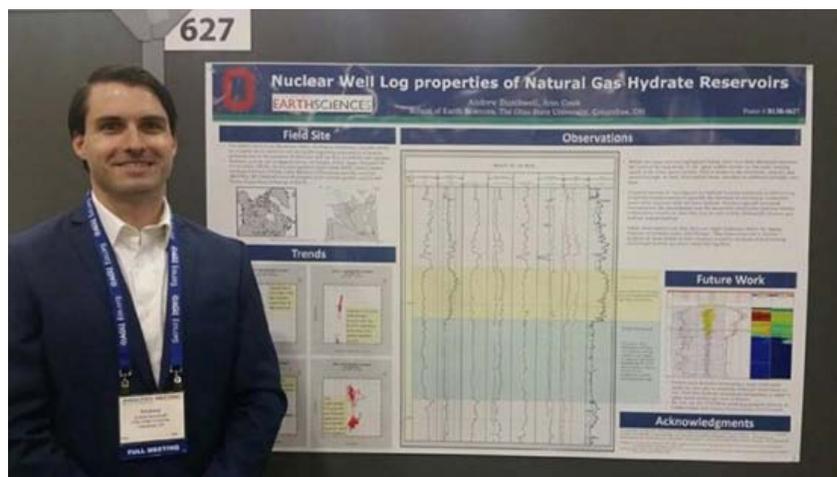
Orton Museum and Back Room Tour

On Thursday December 3rd, Orton Museum Curator Dale Gnidovec led GEOS members and SES students on a fascinating tour of the Orton Museum. Students learned about Ohio geology and paleontology, while also entering the backroom exhibits of minerals below the museum. Thank you Dale for sharing your time and knowledge!



GEOS VP Presents at AGU

Amongst the Buckeye presence at AGU Fall Meeting in San Francisco, our very own Andrew Burchwell presented in the Monday December 14th poster session. The GEOS Vice President presented “Nuclear Well Log Properties of Natural Gas Hydrate Reservoirs”, research conducted under the supervision of Prof Ann Cook. 2015 was a great year for our students presenting at different conferences throughout the nation. Whether at AAPG, SEG, GSA, or AGU, our student members are developing professionally and technically!



Contact us at aapg@osu.edu if you have interest in interacting with the chapter or for more information on all things GEOS in 2016! Stayed tuned and GO BUCKS !!!

Grottoli Team Starts New Project in Hawaii

Contributed by Prof Andrea Grottoli. Grottoli's team has begun a new project in Hawaii to investigate the potential for corals to acclimate to shifts in baseline temperature and acidity conditions expected by the end of this century. In December 2015, Grottoli's team set up the field lab, participated in the setup of the experimental tanks, and tested the new setup with some trial runs. Graduate students Kerri Dobson and Rowan McLachlan will return in February to complete an intensive series of field measurements to document the initial responses of several species of corals to their new baseline conditions after only a month of exposure. These analyses will be repeated every six months for two years, at the end of which we will be able to determine which species of corals are most likely to be able to adapt and survive this century.



Professor Grottoli and her research team at the Hawaii Institute of Marine Biology, Dec 2015. L-R: Prof Andrea Grottoli, grad student Kerri Dobson, volunteer Maddie Rokosh, grad student Rowan McLachlan, and undergraduate Annce Kadri.



Field laboratory at the Hawaii Institute of Marine Biology showing various activities as described.



Experimental setup with 40 tanks. Ten tanks will be held at each of the following conditions: 1) ambient temperature and acidity, 2) ambient temperature with elevated acidity, 3) elevated temperature with ambient acidity, and 4) elevated temperature and acidity.

Annual Coral Bleaching & Long-Term Capacity of Corals

Contributed by Prof Andrea Grottoli. Mass bleaching events are predicted to occur annually later this century. Nevertheless, it remains unknown whether corals will be able to recover between annual bleaching events. Using a combined tank and field experiment, we simulated annual bleaching by exposing three Caribbean coral species (*Porites divaricata*, *Porites astreoides*, and *Orbicella faveolata*) to elevated temperature for 2.5 weeks in two consecutive years. The impact of annual bleaching stress on chlorophyll *a*, energy reserves, calcification, and tissue C and N isotopes was assessed immediately after the second bleaching and after both short and long-term recovery on the reef (1.5 and 11 months, respectively), and then compared to the response of these corals to the first bleaching. While *P. divaricata* and *O. faveolata* were able to recover from repeat bleaching within one year, *P. astreoides* experienced cumulative damage that prevented full recovery within this time frame, suggesting that repeat bleaching had diminished its recovery capacity (See Table 2 from Schoepf et al 2015 below). Specifically, *P. astreoides* was not able to recover protein and carbohydrate concentrations. Since energy reserves promote bleaching resistance, failure to recover from annual bleaching within one year will likely result in the future demise of heat-sensitive coral species.

Table 2. Months after single and repeat bleaching when response variables no longer differed significantly between treatment and control corals of *Porites divaricata* (*P. d.*), *Porites astreoides* (*P. a.*) and *Orbicella faveolata* (*O. f.*). The capacity to recover from annual bleaching was defined as impaired if one or more variables were not fully recovered within 11 months after repeat bleaching. The symbol '–' denotes no statistically significant difference between treatment and control corals at any time and '>11' indicates that bleached corals had not recovered by 11 months.

variable	single bleaching			repeat bleaching		
	<i>P. d.</i>	<i>P. a.</i>	<i>O. f.</i>	<i>P. d.</i>	<i>P. a.</i>	<i>O. f.</i>
symbiont density (cells cm ⁻²) ^a	1.5	1.5	1.5	—	11	1.5
chlorophyll <i>a</i> (µg cm ⁻²) ^b				1.5	11	11
calcification (mg day ⁻¹ cm ⁻²) ^c	1.5	1.5	11	—	11 ^f	1.5
total energy reserves (J gdw ⁻¹) ^d	11	—	—	—	>11	1.5
δ ¹³ C _{h-e} (‰) ^e				1.5	>11	1.5
δ ¹⁵ N _e (‰) ^e				1.5	11	—
capacity to recover from annual bleaching				not impaired	impaired	not impaired

This publication is the product of recent School of Earth Sciences PhD graduate Dr. Verena Schoepf dissertation in Professor Grottoli's lab. Published in the Proceedings of the Royal Society B, it received much press and was featured in Science World Report, the Environmental Monitor, ABC The Drum, and others. Her work is forming a foundation for our understanding of how corals may, or may not, survive the effects of global warming. Dr. Schoepf is not a postdoctoral fellow at the University of Western Australia.

Schoepf V, Grottoli AG, Levas SJ, Aschaffenburg MD, Baumann J, Matsui Y, Warner ME. (2015) Annual coral bleaching can impair the long-term recovery capacity of corals. *Proceedings of the Royal Society B* 282: 20151887.

<http://dx.doi.org/10.1098/rspb.2015.1887>

Prof Panero's Group Featured in Science News

Cayman Unterborn is a PhD student working with Prof Wendy Panero. Cayman's AGU presentation was covered by *ScienceNews* ([link](#)). From the article:

Planets composed of certain element cocktails can't host a continual recycling of Earth-like tectonic plates, new simulations of exoplanet interiors indicate. Measuring the compositions of stars could help astronomers narrow the list of potentially habitable planets, said Cayman Unterborn, who presented the work December 18 at the American Geophysical Union's fall meeting. "This is a new way of thinking — astronomers don't think in geology terms," said Unterborn, an extrasolar planetary scientist at Ohio State University. Exoplanet hunters currently treat an exoplanet as potentially habitable if it falls the right distance from its sun for water to exist in liquid form."

Image shows an illustration of Kepler 186f, from *Science News*.

