

July 2014 News Notes

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Alumni Change Lives

Chunli Dai is a graduate student in Geodetic Science working with Professor CK Shum. Here she explains how funding from the Friends of Orton Hall fund helped to further her graduate studies.

I am thankful that the Friends of Orton Hall fund recently helped to pay a significant part of my travel expenses for a trip to Germany. I attended the International Association of Geodesy (IAG) Scientific Assembly 2013 in Potsdam, from September 1 to 6, 2013. I also visited Prof. Schmidt at DGFI, in Munich, from September 7 to 13, 2013. At this conference, I presented my work about solving for the fault parameters, primarily the centroid location and slip rake angle, of the 2011 Tohoku earthquake using gravity and gravity gradient change using data from the **GRACE satellite**. By looking at the spatial variations of these gravity measurements which span the entire region affected by the earthquake, we are able to obtain a unique view of the source parameters. This annual meeting is a great chance to meet prestigious researchers, who gave me helpful ideas on my research. During this meeting, I also got the opportunity to exchange research ideas with other young scientists, and to propose future collaborations. It was exciting for me to see the forefront of earthquake research using geodetic data, e.g. the real-time co-seismic displacements from GPS data and the ionospheric change corresponding to the earthquake. My dissertation topic will focus on the combination of GRACE and GPS data to solve for an enhanced slip model for large submarine earthquakes. This improved slip model will contribute to our understanding of centroid locations due to the excellent spatial coverage from GRACE data, and to be able to construct detailed distribution of the fault slip based on the dense on-shore GPS network. The location, orientation, and slip distribution of the fault are critical for understanding fault mechanisms. I am grateful for the Friends of Orton Hall fund that makes this all possible. Photo was taken in front of the Einstein Tower in GFZ in Potsdam, Germany.



Professor Grottoli Featured in Global Change Biology

Professor Grottoli appears in the July 9 online edition of Global Change Biology. Professor Grottoli's study, the first of its kind, is further detailed in [OSU Research News](#). From the story, entitled "For Corals Adapting to Climate Change, It's Survival of the Fattest—and Most Flexible":

The future health of the world's coral reefs and the animals that depend on them relies in part on the ability of one tiny symbiotic sea creature to get fat—and to be flexible about the type of algae it cooperates with.

In the first study of its kind, scientists at The Ohio State University discovered that corals—tiny reef-forming animals that live symbiotically with algae—are better able to recover from yearly bouts of heat stress, called "bleaching," when they keep large energy reserves—mostly as fat—socked away in their cells.

"We found that some coral are able to acclimatize to annual bleaching, while others actually become more susceptible to it over time," said [Professor] Grottoli. "We concluded that annual coral bleaching could cause a decline in coral diversity, and an overall decline of coral reefs worldwide."

Grottoli's findings have received coverage in [NSF Science 360](#), [Science News Guru](#), and elsewhere. Congratulations, Andréa!

The full citation is: Grottoli AG, Warner ME, Levas SJ, Aschaffenburg M, Schoepf V, McGinley M, Baumann J, Matsui Y (2014) The cumulative impact of annual coral bleaching turns some coral species winners into losers. *Global Change Biology* 10.1111/gcb.12658

Photo at left: A closeup of polyps of *Orbicella faveolata*, more commonly known as boulder coral. Grottoli's team is pictured at right. From left to right, Stephen Levas (SES grad student), Andrea Grottoli (lead-PI), Teresa Huey (undergrad in SENR), Verena Scheopf (SES grad student), Justin Baumann (SES undergrad).



Faculty Profile: Ann Cook

I became a Geoscience major in my sophomore year in college at the University of Tulsa, after losing interest in chemical engineering. At that point, I was just excited to find a major that might involve being outside. But I am not sure I was really sold on geology. Rocks? People like those things?

The summer following my sophomore year, I snagged an amazing opportunity at Lamont Doherty Earth Observatory as an undergraduate intern. I won't lie, the thing that initially attracted me to the internship was that I got to spend the summer in New York City. But I found Lamont to be an amazing place. I met some of the scientists who were key players in the development of the theory of Plate Tectonics and who were world-renowned experts in a variety of fields. And I also learned something amazing: they didn't know everything. Some of them even said they knew very little. They were trying to figure out interesting, unknown things about the earth. I was enchanted.

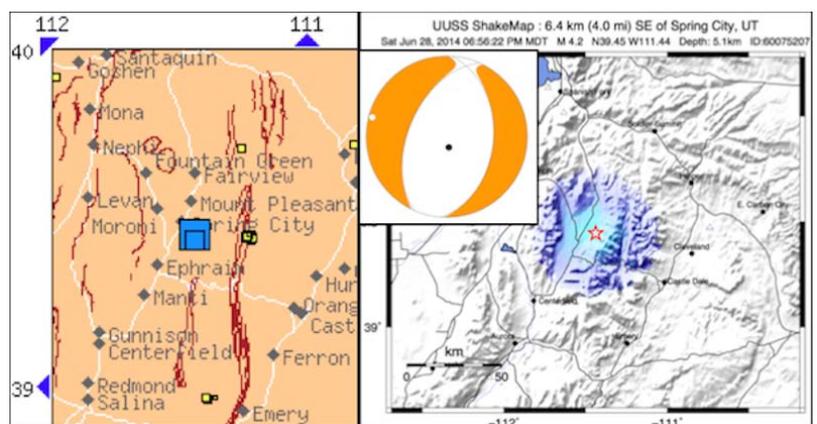
After finishing my undergrad in geology, I went back to Lamont and earned my PhD in Marine Geology and Geophysics. The main focus of my PhD, as well as some of my current research, is characterizing the global gas hydrate reservoir, especially the measurement of in situ gas hydrate reservoirs using geophysical well logs. There is actually very little understood about natural gas hydrates, which means, of course, that there is much to discover! Currently, I have two grants from the Department of Energy, which look at both the amount and the formation of natural gas hydrates in the Gulf of Mexico. I also have a small grant looking at organic matter distribution in the Utica Shale.

Because my undergraduate research experience at Lamont was such a pivotal moment in my career, I will always work with undergraduate students. At Ohio State, I teach several undergraduate courses, in Natural Hazards, Energy and Environment, Applied Geophysics and Energy Geophysics. I also work with several undergraduates on different research projects and my hope is that I am giving them a taste of what original research is like and the many things still unknown about the earth.



Two earthquakes in Sanpete during Field Camp 2014

On June 28th, 2014, two earthquakes occurred 10 miles north of Ephraim, our field camp base ([link](#)). An M4.2 normal-faulting event (shake map and moment tensor solution shown at right), was followed by an M3.2 event a few hours later. Both occurred at a depth of ~3 miles. Although no fault is mapped in this location, the events fall within the Intermountain Seismic Belt running north-south in Utah, encompassing the Wasatch Fault. Most of the field camp students and staff felt the larger of the two events – a unique geologic experience!



Field Camp 2014 completed

Field Camp has just completed its 67th year in Sanpete Valley, Utah. This year 22 students participated. Instructors for this summer were Dan Kelley (BGSU-Firelands), Shelley Judge (Wooster), Cristina Millan and Terry Wilson (both OSU). All instructors helping Wilson teach the course this year were either alums of OSU field camp or OSU PhDs. The caravan of four vans stopped en route to Ephraim for a lunch hosted by Joe and Marcia Newhart at their home in Colorado. The early mapping exercises took place at White Hill, South Ephraim and Temple Hill. An exercise emphasizing petroleum exploration geology, integrating study of the Providence Field drill core (at the Utah Core Research Center, Utah Geological Survey) examined subsurface units of the Sanpete-Sevier anticline and the field-based South Cross Section exercise across Sanpete Valley near Sterling. Later exercises included mapping at Fayette and Rock & Dry Canyons on the margins of the San Pitch Mountains (Gunnison Plateau) and the North Cross Section exercise cross the Sanpete Valley and San Pitch Mountains corridor of the Sevier foreland basin & thrust belt. The group examined the regional geology of Capitol Reef National Park, the volcanic rocks of the Marysvale volcanic field, recent basalts near Fillmore in the Black Rock Desert, the Sevier thrust belt in the Canyon Range, the Snake Range metamorphic core complex, the Wasatch Fault, the Alta Stock in Little Cottonwood Canyon, and visited the Bingham Canyon mine. As ever, we pack in the maximum amount of geology we can!



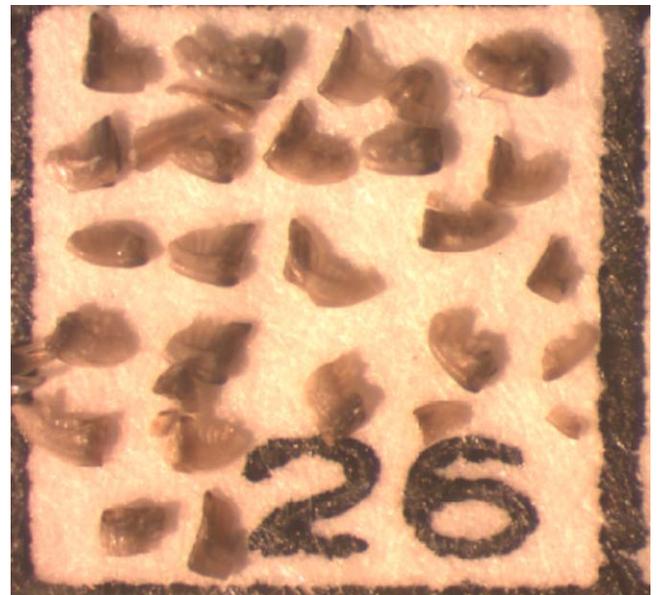
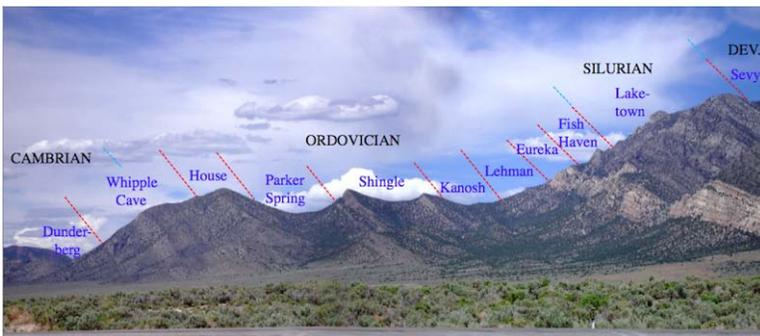
Top left: The students with Joe Newhart in route to field camp. Top right: The Goose-necks overlook, Capitol Reef National Park. Bottom left: Sevier thrust belt, Canyon range.

Professor Saltzman slices up Ordovician time

A paper published this month in the journal *Geological Society of America Bulletin* ([link](#)) by Dr. Matthew Saltzman and others (full reference below) draws on more than a half century of Ordovician conodont paleontology research at Ohio State to develop a new, high-resolution time stratigraphic framework. The study analyzed conodont apatite for Sr isotope ratios in the Radiogenic Isotope Laboratory in Mendenhall Lab (previously maintained by Prof. Emeritus Ken Foland) to produce a seawater curve with comparable time resolution to parts of the Cenozoic. This new Sr isotope curve can be used to date Ordovician rock samples and also has implications for links between chemical weathering of the continents and greenhouse-icehouse global climate transitions. The analytical work was largely done by current PhD student Cole Edwards working in Saltzman's lab, but builds on Sr isotope studies of former Ohio State graduate students Seth Young (Asst. Prof, Florida State Univ) and Alexa Sedlacek (Asst. Prof, Univ Northern Iowa). The conodonts used (unfortunately this was a destructive analysis of about 0.5 mg!) were collected by former Ohio State students including Steve Leslie (PhD 1995, now Prof and Head, James Madison U.) and Jeff Bauer (PhD 1985, now Prof and Dean, Shawnee State U.) as well as others in the research groups of SES Professors Emeritus Walt Sweet and Stig Bergström. The full citation is:

Saltzman, M.R., Edwards, C.T., Leslie, S.A., Dwyer, G. S., Bauer, J.A., Repetski, J.E., Harris, A.G., and Bergström, S.M., 2014, Calibration of a conodont apatite-based Ordovician $87\text{Sr}/86\text{Sr}$ curve to biostratigraphy and geochronology: Implications for stratigraphic resolution: *Geological Society of America Bulletin*, doi: 10.1130/B31038.1

The photo below shows Saltzman's field site in Shingle Pass, Nevada. The photo at right shows Ordovician conodonts analyzed for Sr isotopes by Saltzman and others.



Professor Moortgat receives SPE award

Professor Moortgat was chosen as the 2014 recipient of the Society of Petroleum Engineers (SPE) Cedric K. Ferguson Medal as first author of the paper "CO₂ Injection in Vertical and Horizontal Cores: Measurements and Numerical Simulation."

The SPE Cedric K. Ferguson Medal will be awarded on Tuesday evening, 28 October 2014, during the SPE Annual Banquet, by the president of the SPE. The Annual Banquet is a featured event during the Society's Annual Technical Conference and Exhibition that will take place 27-29 October 2014 at the RAI Center in Amsterdam, The Netherlands.

Awardees were announced on the SPE website ([link](#)). Congratulations, Joachim!

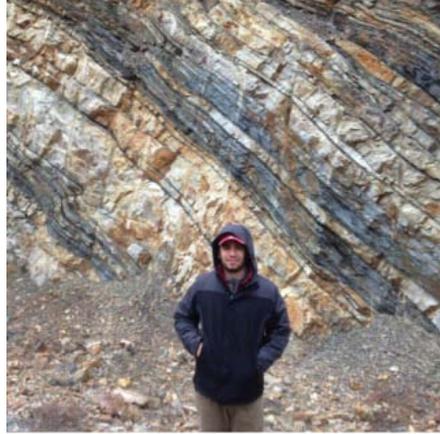
AAPG chapter preparing for coming year

This story was contributed by Mario Gutierrez, president of the OSU AAPG chapter.

The AAPG Student Chapter at OSU is currently preparing for the coming year, continuing to build off of last year's increased presence at the 2014 AAPG ACE in Houston, TX. We plan to be present in the Alumni News Notes this year in order to continue to inform and update alumni of the chapter's activity and direction.

We are proud to announce the Executive Board for the 2014-2015 year, see photos at right. Clockwise, from top left are Mario Andres Gutierrez (president), Andrew Burchwell (vice-president), Mackenzie Scharenberg (treasurer), and Hannah Brouman (secretary).

In addition to several members attending the OSU Field Camp in Utah and conducting research at the Shell Undergraduate Research Experience on campus, the following current and recent graduating members are spending their summers participating in different industry and research opportunities.



- *Jake Harrington* - internship with Cabot Oil & Gas Corporation in Houston, Texas
- *Mackenzie Scharenberg* - conducting reservoir characterization research with Dr. Larry Lake of the Petroleum & Geosystems Engineering Department at University of Texas in Austin, Tx.
- *Ben Grove* - continuing internship focused on CO₂ sequestration with Battelle Memorial Institute in Columbus, Ohio.
- *Joel Main* - internship focused on CO₂ sequestration with Battelle Memorial Institute in Columbus, Ohio.
- *Zachariah Cowan* - internship focused noble gas geochemistry with the U.S Geological Survey in Denver, Colorado.
- *Daniel Enriquez* - gas chromatography lab technician position with the Mudrock Systems Laboratory (MSRL) at the Bureau of Economic Geology in Austin, Texas.

Upcoming AAPG Events and Activity

AAPG/SEG Student Expo – Sept 8-9 in Houston, TX.

42th Annual Eastern Section AAPG Meeting – Sept 27-30, in London, Ontario, Canada

Please let us know if you will be these upcoming events!

Contact us at aapg@osu.edu for more information on all things AAPG at Ohio State.

Stayed tuned and GO BUCKS !!!

Professor Cole's group presents research

Prof. Cole and PhD students Alex Swift, Tingting Liu and Brandon McAdams attended the V.M. Goldschmidt conference in Sacramento. Alex Swift presented an oral presentation titled "Microscale characteristics and macroscale disequilibrium in hydraulically fractured Utica shale", co-authored with D.R. Cole, J. Sheets, S. Welch from OSU, L. Anovitz from ORNL, X. Gu from Penn State, D. Mildner from NIST and S. Chipera from Chesapeake Energy. Tingting Liu presented a poster titled "A first principles study of water adsorption and dissociation on olivine surfaces" with Profs. Cole and A. Asthagiri (Chem Eng., OSU). Brandon McAdams gave an oral talk titled "Voltammetric measurement of redox species in Prairie Pothole lake benthic pore waters" with W. Arnold and Prof. Yo Chin of OSU. Prof. Cole presented two invited talks – one titled "Dynamical behavior of propane under nano-confinement: neutron scattering studies" co-authored with S. Gautam and T. Liu of Ohio State, G. Rother, L. Anovitz, E. Mamontov and A. Kolesnikov of ORNL, A. Striolo and A. Phan of the University College London. The second talk was titled – "(U)SANS and imaging analysis of changes in multiscale porosity in the St. Peter Sandstone with burial diagenesis" co-authored with L. Anovitz, G. Rother, K. Littrell of ORNL, M. Wasbrough of NIST, V. Pipich of the Julich Scattering Centre, Germany, J. Freiburg, Illinois Geol. Survey.

Brevia

PhD student Alex Swift (adviser: David Cole) was senior author on a paper published in the AAPG-based journal *Environmental Geosciences* (June 2014), vol. 21, 39-57 titled "Relationship between Mineralogy and Porosity in Seals Relevant to Geologic CO₂ Sequestration" with L. Anovitz of Oak Ridge National Laboratory (ORNL), J. Sheets, D. Cole, S. Welch (OSU) and G. Rother (ORNL). The cover of this issue also used one of Alex's figures. Congratulations, Alex!

Alex Swift and Prof. Cole spent a week at NIST Center for Neutron Research conducting small and ultra-small angle neutron scattering experiments on assorted reservoir and seal rocks from the mid-continent.