Council on Undergraduate Research – Geosciences Division

2016 GeoCUR Award for Excellence in Student Research

Gabriel Ahrendt, Zachary Gude, Daniel Wood

University of South Florida

School of Geosciences, Nominated by: Dr. Jeffrey Ryan

I'm nominating a team of undergraduates for the Excellence in Student Research Award: Gabriel Ahrendt, Zachary Gude, and Daniel Wood. I'm nominating them as a team because more than any students I've mentored, they work as a team, cooperating on every aspect of their research.

Gabe, Zach and Daniel were in my GLY 3311C course, and as such investigated NC Blue Ridge samples via electron microprobe. They got interested in amphibolites from Glade Gap in the Buck Creek complex, and have been studying them since. Their original hypothesis – that Glade Gap rocks represent basalts in the Buck Creek oceanic section – expanded with their discovery of intercalated metasedimentary rocks in the amphibolites. They're now re-evaluating the position of the Chunky Gal Fault in light of the new samples and outcrops they've found.

They excel in scientific teamwork, partly from necessity: Daniel is non-traditional with an IT job, Zach is finishing his courses, and Gabe is in the midst of our core Geology offerings. They coordinate via Skype, and divide labor based on who can do what - Zach and Gabe did their additional fieldwork while Daniel led geochemical efforts, and the three tag-team on petrography and microprobe. They presented results at the GSA Annual Meeting in November, and will do a fuller presentation of their project at the NCUR Conference in Asheville.

They're all thinking of graduate opportunities in metamorphic petrology. It's been great fun watching them interrogate their samples and think out the possibilities. Please give them serious consideration for the award.

Corey Brazell, Brigham Young University - Idaho

Department of Geology, Nominated by: Dr. Megan Pickard

The Geology Department at Brigham Young University – Idaho would like to recognize Corey Brazell for his excellent work as an undergraduate researcher. Corey is a senior majoring in geology and over the past year, has contributed to or oversaw at least two research different projects. His main research, titled "Chemical analysis on volcaniclastic deposits from the Taranaki Basin, New Zealand", focuses on the petrographic characterization of primary

igneous minerals reworked in debris flow deposits from the Miocene Mohakatino Formation. Prior to Corey's work, research had focused almost entirely on the sedimentology and stratigraphy of the formation. Corey is providing key information to expand understanding of an offshore, now buried Miocene arc system. Specifically he performed all of the sample preparation for thin sections and analyzed over a hundred mineral compositions with an electron microprobe. He learns quickly and works accurately and has shown an excellent ability to handle and analyze large and complex databases of mineral composition information. In addition, Corey has demonstrated his drive for learning by doing by being independently motivated to work on and complete his research project. Currently Corey is mentoring a sophomore level undergraduate to take over the project when he graduates. He will be presenting his research this spring at BYU-Idaho's Research and Creative Works Conference and the AGU Virtual Poster Showcase. We are proud to nominate Corey as a top undergraduate researcher.

Jonathan Brock, University of Tennessee at Chattanooga

Department of Biology, Geology, and Environmental Science,
Nominated by: Dr. Amy Brock-Hon

Jonathan Brock formulated a study to apply cathodoluminescence (CL) techniques to Pleistocene Bahamian carbonates. He seeks to first, determine the feasibility of CL methods to differentiate between carbonate cements exposed on the island of San Salvador, and with this information, determine if a third stratigraphic member exists as described in previous studies. Overall, he seeks to resolve a disagreement regarding the Pleistocene stratigraphy of the island and his results will contribute to a more accurate stratigraphic column of these Bahamian carbonates. Jonathan is deserving of this award because his motivation to solve a geologic problem with a novel technique is self-initiated, and he has conducted impressive preliminary and preparatory work.

Laurel Garrett, Lewis & Clark College

Department of Environmental Studies, Nominated by: Dr. Jessica Kleiss

Throughout her undergraduate research, Laurel has consistently demonstrated a critical eye towards validating the results she achieves. This is a challenging skill for undergraduates, who are habituated to problem sets with known solutions and wise professors who know all the answers. Laurel excelled at examining the results from her analysis and asking the critical questions, "Is this right? Does this make sense? What additional analysis can we do to confirm these results?" As a result, Laurel has developed an image-processing algorithm with skill differentiating different cloud types from digital all-sky images. She has incorporated this Atmospheric Science research with a strong component of computer programming into her Environmental Studies senior thesis. To do this, she needed to examine the data and the methods commonly used in atmospheric science research, and frame them in the context of science and technology studies. Why do scientists describe the atmosphere using the present variables and terms? How has our western history and culture influenced our technology to obtain atmospheric data, which then informs our theories and conceptualization of our physical world? Her interdisciplinary thesis serves both as a contribution to the field of automated cloud

classification as well as a an interdisciplinary contextualization of the process of atmospheric science discovery.

Kathryn Gerber, Calvin College

Department of Geology, Geography and Environmental Studies
Nominated by: Dr. Deanna van Dijk

Kathryn (Katy) Gerber will graduate from Calvin College with an impressive record of undergraduate research in the geosciences. Katy is an honors student majoring in environmental studies and biology. She began undergraduate research in her first college semester as part of the First-Year Research in Earth Sciences (FYRES) project, where she was on a research team investigating the impacts of autumn storms on coastal dune geomorphology. The following year, Katy carried out an ethnographic study of livestock exchange programs during an off-campus semester in Ghana. In her junior year, Katy became a FYRES Research Mentor: an upper-level undergraduate researcher who mentors first-year students through geoscience research. After the first-year students finished their work, Katy continued the research—investigating the effectiveness of planted vegetation on a steep dune slope—to bring the project to completion in a conference presentation and research report. In her last year at Calvin, Katy is once again a FYRES Research Mentor, this time investigating the effectiveness of restoring a population of a rare dune plant. Katy's other research experiences have included an environmental health internship with the Centers for Disease Control and Prevention in summer 2015, and her current honors research project to create a water livelihood vulnerability index for communities in Ethiopia. Katy's excellence in undergraduate research includes the breadth of her research activities—from Michigan dunes to environmental health to studying water and community issues in Africa—and the lasting impacts of mentoring first-year students towards positive geoscience research experiences.

Joseph Mason, Fort Lewis College

Department of Geosciences, Nominated by: Dr. Kimberly Hannula

Fantastic visualization of hypotheses, repeated fieldwork to test hypotheses, great visualization of the field data (including GIS work), beautifully written thesis. Fantastic work all around.

Jennifer McLeod, University of Wisconsin Oshkosh

Department of Geology, Nominated by: Dr. Jennifer Wenner

I am writing to nominate Jennifer McLeod for the GeoCUR Award for Excellence in Student Research. A geology major at the University of Wisconsin Oshkosh, Jen is a bright and motivated student who has shown herself to be an excellent field geologist, a meticulous lab scientist, and a dedicated researcher. Since Fall 2014, she has been working on a project dealing with the chemistry of plagioclase and what it can tell us about magmatic processes. In order to work on this project, Jen wrote grants to procure independent funding through Sigma Xi and the Geology Department at UWO. Her work in the Poison Lake chain, near Lassen Peak, California, involves a set of 15 basaltic cones and flows that are more evolved than their contemporaneous, primitive neighbors. Using field work and electron microprobe and BSE

analysis of the complex textures in plagioclase, she developed a model of magmatic activity that explains both the textures she observes and the presence of evolved basalts in a volcanic field dominated by mantle-derived rocks. She recently presented this work, which contributes to our understanding of magmatic activity in continental arcs, at the National Meeting of GSA in Baltimore. Jen is fully engaged with the scientific process and I have been impressed with her constant modification of her research questions to push her research to the next level. Jen's positive attitude, academic excellence and distinction as a student researcher make her ideal for this award.

Quinn Montgomery, University of San Diego

Department of Environmental and Ocean Sciences, Nominated by: Dr. Beth O'Shea

Quinn Montgomery has been an undergraduate researcher since Spring of 2015 studying the formation of marine snow aggregates and its implications for marine carbon cycling. Quinn has achieved impressive results, including being funded as a Summer Undergraduate Research Experience Scholar and presenting his research at Ocean Sciences Meeting, a large international conference, in February 2016. Quinn is extremely creative, hard-working, and thoughtful about his research, and his dedication to his research is evident in his growth throughout his undergraduate career.

Scott Raulerson, Georgia College and State University

Department of Biological and Environmental Sciences, Nominated by: Dr. Samuel Mutiti

Scott Raulerson is a very good and hardworking researcher. He has been working on a project investigating carbon storage capacities of two different wetlands and a flood plain. In this project he has been utilizing a variety of methods to quantify carbon storage in these locations. He is also using GIS, LiDAR and other remote sensing techniques to estimate carbon storage. He is a very hardworking, extremely independent and reliable student. He is very creative and resourceful, with an amazing ability to make the most out of the limited resources available. Scott has done a lot of quality work and has already presented some of his preliminary results at the Geological Society of America national meeting. Scott is also a good student teacher and mentor. He has been helping and mentoring other undergraduate students (and helping some graduate students). He has been helping them on their projects and training them on how to use lab equipment. I am extremely impressed with his attitude and ability to independently learn and apply new concepts.

Mary Reinthal, The College of Wooster

Department of Geology, Nominated by: Dr. Meagen Pollock

Mary Reinthal is investigating the relationship between ice thickness and eruptive style in glaciovolcanic eruptions. She is measuring the volatile content of glassy pillow lava rinds from a site called Pillow Ridge in northern British Columbia, Canada. Combining her data with a solubility model, she is able to calculate emplacement pressures and reconstruct paleo-ice thicknesses. Mary's findings are filling a large gap in our knowledge of the relationships among eruptive dynamics, magmatic conditions, and ice thickness. Her study represents one of only a

few high-resolution investigations of volatile contents in pillow-dominated subglacial edifices, particularly in alkaline basalt complexes. Mary's work began in the summer following her first year, when she was awarded the prestigious Clare Boothe Luce scholarship in support of women in the physical sciences. Mary has since mastered complex analytical methods, such as FTIR, XRF, ICP-MS, and EMPA, and serves as a valuable peer mentor to rising geology majors in our research group. She has already presented her work at international conferences, including the annual meetings of the American Geophysical Union in San Francisco, CA (2013), the Geological Society of America in Vancouver, Canada (2014), and the Volcanic and Magmatic Studies Group in Dublin, Ireland (2016), in which Mary was one of three total undergraduate presenters. She represented herself and her collaborators well on the international stage, and has a bright scientific future ahead of her.

Hanna Sherman, Wittenberg University

Department of Geology, Nominated by: Dr. Sarah Fortner

Hanna has been a member of our department since her freshman year, fall semester, 2012. Academically, Hanna is a strong student (GPA: 3.59) and a standout among her peers. She is attentive in class, performs well on exams, and works hard in labs. The high quality of Hanna's work is not only a reflection of her academic ability, but also her enthusiasm for geology and problems solving. Hanna is also skilled in field work. This past summer, she spent a month in Greece working on an archaeologic shoreline project through the Institute for Field Research. The project involved a survey of maritime landscapes and vertical tectonic movements through the study of tidal notches. It is noteworthy that Hanna pursued this opportunity of her own accord. She also wrote a research proposal for, and acquired funding through two departmental grants (totaling $3500) to help support her research. This research has also served as the basis for her senior thesis. Hanna has also attended two of our Field Seminars, 4-day-long off-campus trips to the St. Francois Mountains of Missouri and the Mammoth Cave area of Kentucky. During field work, her ability to retain lecture material and apply that material in field settings has been impressive. She remains on task, works hard, and thinks about the data that she is collecting. Through term papers, her thesis proposal, and preliminary work on her thesis, Hanna's writing has been organized, thoughtful, attentive to detail, and professional. We enthusiastically recommend Hanna for this award.

Perri Silverhart, Middlebury College

Department of Geology, Nominated by: Dr. Patricia Manley

The Middlebury College Geology Department would like to nominate Perri Silverhart for the CUR Award for Excellence in Research. Perri has participated in research with 4 out of 7 members of our department and has made remarkable contributions to every project she has worked on. She has worked on a wide range of projects, including geophysical surveys of Lake Champlain, synthesis and characterization of arsenic-bearing magnesite, field mapping in Argentina to sample foreland basin deposits, reconstructing past earthquakes on a fault in northern California and numerical modeling of lake tsunamis. In addition to an untiring work ethic, Perri has a love for geology, a natural curiosity, and endless enthusiasm. She eagerly dives into a variety of activities in the field or in the lab and always is quick to learn new techniques. She is very careful and diligent in her work, and understands the research at a

deep level. Although quiet by nature she takes on leadership roles in group work that helps to bring the project to fruition. She was instrumental in starting Women in Science Club at Middlebury College to foster STEM awareness of women. Perri has evolved into a first-class scientific thinker and we look forward to seeing where her career in Earth Science takes her! We are proud to nominate Perri for this award as she is truly one of the many talented students we have encountered at Middlebury.

Judith Smith, The Pennsylvania State University

Department of Geography, Nominated by: Dr. Laura Guertin

Judith Smith, currently a junior in the Department of Geography at The Pennsylvania State University, continues to engage with her undergraduate research project begun while a student at Penn State Brandywine. In Summer 2015, Judy joined a collaborative project between Penn State Brandywine and the Society of Exploration Geophysicists (SEG) in authoring articles for the SEG Wiki, a geoscience- & geophysics-focused online resource. Judy has successfully taken her Earth science content knowledge and learned the necessary MediaWiki language to write original SEG Wiki pages on introductory-level topics such as plate tectonics, clean energy, fuel cells, and hydrography. She presented her work at an AGU Virtual Poster Showcase and has co-authored an article on her AGU VPS experience for the NAGT 2YC newsletter. Judy continues to this day authoring quality articles for the SEG Wiki that will benefit a broad audience of users from geoscientists across the globe to K-16 students and teachers.

Travis Sparks, Angelo State University

Department of Physics and Geosciences, Nominated by: Dr. Heather Lehto

Travis is one of the best field geologists to pass through Angelo State University (ASU). He is incredibly observant in the field and is always asking questions and offering hypotheses on his feet. His enthusiasm for geology is evident during any conversation and is very infectious. It is easy to see that Travis loves geology and has a true talent for recognizing and interpreting geologic relations.

His research project involves the detailed mapping of structures within the Llano uplift in central Texas where he is constructing a grid of cross sections across folded and faulted Paleozoic strata. Travis obtained permission on his own to map the area which covers three ranches and has not been seen by a geologist since the 1940's. His research advisor has remarked that Travis is unusually adept visualizing in three dimensions and is ready at a moment's notice to explain his research to anyone.

Travis's communication skills are far above his classmates and display a mastery of the geologic literature that is well beyond his undergraduate standing. While reading his writing it is easy to forget he is a student and not a colleague. He is currently writing a paper on his research and coauthoring a paper for the 2016 Southwest AAPG field trip guidebook.

Perhaps the best reflection of Travis' abilities is found in a comment from his research advisor, Dr. Joseph Satterfield, "[Travis is] the single most well-rounded research student and future graduate student I have worked with in 13 years at ASU."

Sarah Thorne, Trinity University

Department of Geosciences, Nominated by: Dr. Benjamin Surpless

Sarah Thorne has worked closely with me since the summer of 2015, integrating stream-profile analysis with structural analysis and gravity data to evaluate the evolution of an active, major normal fault system in the western Basin and Range Province. Her work has involved using ArcGIS and Matlab to develop detailed models of stream networks, providing quantitative data that permits us to identify and analyze segments of the Wassuk Range normal fault system in the context of previous work along the range front. Together, we have developed a transferable model of remote fault-system analysis that can be applied to major fault systems in less-well-studied locations. Sarah and I are currently writing a manuscript to be submitted in early summer, with Sarah taking the lead in the writing process.

Sarah has excelled in her research with me, displaying intellectual independence throughout the research process, and at the 2015 Geological Society of America's national meeting, in Baltimore, Maryland, she presented her findings to the broader geologic community, exhibiting both clarity in explanation and panache in answering difficult questions from some of the top researchers in the field. Although I worked most closely with Sarah on her research, all members of the Department of Geosciences attest to her work ethic, her fantastic attitude, and her well-established aptitude across the geologic disciplines. We see Sarah's tremendous potential in the geosciences.

Katherine Whiteman, Chapman University

Department of Environmental Science and Policy, Nominated by: Dr. Christopher Kim

Katherine Whiteman has distinguished herself through 2.5 years of independent research in environmental geochemistry as an enthusiastic, focused, hard-working, and collegial student and researcher. Among other contributions to the Environmental Geochemistry Lab, she has conducted frequent field samplings, participated in field X-ray fluorescence analyses, and designed and conducted an array of lab experiments that have significantly influenced our understanding of the distribution, bioaccessibility, and transport of arsenic in mine tailings materials within a suburban setting. Katherine has demonstrated significant growth in her critical thinking, data analysis, and independent problem-solving skills through her undergraduate research experience that will undoubtedly serve her well in her future interests in environmental education and sustainability.

Katherine's work has been accepted for presentation at the national American Chemical Society meeting in March 2016 (Geochemistry Division) and she is at work on revisions to a scientific manuscript on which she is a co-author, which will likely see publication this year. This represents the highest level of accomplishment for undergraduate research and is testament to her dedication towards her research. It is with great pleasure that the faculty of the Environmental Science & Policy degree program at Chapman University name Katherine as its selection for the 2016 GeoCUR Award for Excellence in Student Research.