



THE COLLEGE OF
WOOSTER

DEPARTMENT OF EARTH SCIENCES

THIRTY-SIXTH ANNUAL REPORT

August 2022



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THE COLLEGE OF **WOOSTER**

August 2022

Dear Alumni and Friends:

I hope that this letter finds you and your family and friends well and enjoying the summer.

I am so happy to report that last academic year felt nearly 'normal'. At some point during the previous two years students juggled in person, hybrid, and fully remote classes at Wooster. Not last year. We were in person!! Of course there were pandemic protocols (such as masks, testing, and isolation), but the unique style of a Wooster education with its intense mentoring was eerily familiar to the faculty—although for some students it was the first full year of in person courses in college. It felt great to be back doing what we do best. It is why many of the faculty wanted to work at a place like Wooster: so that we could have these daily interactions with colleagues and students.

It was wonderful to see people laughing in the classrooms once again throughout the year.

Despite seeming 'normal' because classes were in person, the world around us still faced many challenges. I would be remiss if I did not acknowledge this. Our students, staff, and faculty are more than just Earth scientists; they are sensitive to many of our societal struggles because their own families are facing them daily. We continue to be mindful of the ways in which many in our Scovel Hall family have been touched by these global, regional, and local events: the continuing global pandemic, climate change, social injustices, and political turmoil. The best that we can do as a Scovel unit is to create an equitable teaching and learning environment in which all are thriving. My wish is for faculty and staff to be at their best as mentors, while students are seizing opportunities to challenge themselves and their personal boundaries.

And, our best this past year was awesome. Faculty and staff worked to provide field trip opportunities to our students, making sure our students had hands-on experiences in lab, computer, and outdoor settings. Often, this work led to incredible research (some of which was I.S.-driven) that resulted in our department showcasing results at national meetings. Earth Sciences presented at GSA's annual meeting in Portland, AGU's annual meeting in New Orleans, and GSA's regional meeting in Cincinnati. In addition, faculty and students won national awards. Students earned scholarships, snagged some of the coolest summer internships, and worked jobs that provided life-long skills.

Last year saw a major personnel change in our department. At the end of the fall semester, Patrice Reeder, our long-time and fabulous administrative coordinator, left the college for employment closer to her home and extended family. Everyone in Scovel—from the faculty/staff of Earth Sciences and Philosophy to all our students—thanks her for her dedicated years of service to Wooster. She simply made Scovel Hall run smoothly. The search for a new administrative coordinator began, and lucky for Scovel, Earth Sciences and Philosophy were

Department of Earth Sciences

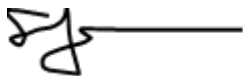
able to hire Broede Armstrong, who started at the beginning of the spring semester. Broede came to us with many years of experience at Wooster in a variety of offices, most recently from the Registrar. Although there was probably a learning curve for Broede in her new position, from the perspective of Earth Sciences and Philosophy, Scovel continues to function at the same amazing high level. I thank Broede for her hard work on this annual report and for her continued support of the operations and budget of Earth Sciences (in addition to Philosophy, Moot Court, and Pre-Law). Her in-depth knowledge of registration is particularly helpful to our faculty and students. Lucky for Scovel, Nick Wiesenberg, our departmental technician, is still with us providing superb daily logistical and equipment support. I know that all the faculty—Mark, Greg, Meagen, and myself—appreciate what he does for each of us to make our classrooms and lab spaces the best learning environments for our students. We especially thank him for his assistance with department field trips, whether they are in Wayne County or out-of-state. Simply, Nick handles many of the ‘little things’ both in Scovel and in the field, making our jobs easier in the end.

My three faculty colleagues maintain a level of excellence at Wooster in all they do, and this is a continued source of inspiration. They help make Earth Sciences shine at Wooster (and beyond). I thank them for their support and for their sustained goal of teaching, research, and service distinction, while at the same time providing daily equitable mentoring for all students. Last academic year, Mark was on research leave during fall 2021, and Meagen was on leave during spring 2022. Meagen will continue her research leave during fall 2022, and Greg will go on leave during spring 2023. As a result of these leaves, we held a search for a visiting faculty member for the 2022-2023 year. Vibhor Agarwal (Ph.D. OSU 2020; Postdoc Dayton) will join us. Vibhor uses big data and computational techniques, along with GIS and remote sensing, to answer critical climate/glaciology questions.

The 2022-2023 academic year is only a few weeks away, and there is already a ‘buzz’ on campus. Renovations to the dining facilities on the first floor of the student center—which is the social heart of the campus—should be complete for the start of the new academic year. This will provide enhanced meal options for our students and bring back that ‘gathering hub’ that they all missed last year. As usual, I am looking forward to a new academic year because every year is a chance for new teaching and learning opportunities with students and colleagues. This year will be no different, especially since we have a large senior class of I.S. students.

At the end of this report is the Alumni Information Sheet with an online update link. Please keep in touch with us and send news when you can. We enjoy hearing from you. I will continue as department chair through December 2022, at which time I will pass the duties to Meagen Pollock. Meagen will begin her second term as chair in January 2023. I know that I speak for the both of us when I say if we can provide any additional information about the department or help in any way in the coming months, do not hesitate to contact us.

Be well, and as always, GO SCOTS!!



Shelley Judge
Associate Professor and Chair

Department of Earth Sciences



Associate Professor
Earth Sciences Department Chair
B.S. Mount Union University, 1991
M.A.T. Kent State University, 1993
M.S. Ohio State University, 1998
Ph.D. Ohio State University, 2007
Wooster since 2008

Shelley Judge

During the fall semester, Shelley taught Introduction to Web GIS, Tectonics and Basin Analysis, and Geologic Field Techniques (a new course). During the spring semester, she taught Oceanography, Earth Systems, Social and Environmental Justice Issues in the Earth Sciences (a new course), a Tutorial in Structural Geology Lab Applications, and a Tutorial in Advanced Structural Geology Modeling using the MOVE suite.

This past academic year, Shelley worked with **Srushti Chaudhari ('22)**, **Mazvita Chikomo ('22)**, and **Wylie Greeson ('22)** for the entire year on their Senior I.S. projects. Their projects were diverse: Srushti focused on the impact of climate change on glaciers in the Himalayas, Mazvita modeled the groundwater flow on The Ohio State University main campus, and Wylie worked on an engaging children's book that hoped to increase environmental literacy. She will always cherish the amazing conversations in weekly I.S. meetings with this group.

Shelley also worked with several seniors while Mark Wilson and Meagen Pollock were on research leave in successive semesters. **Kate Runciman ('22)** focused on the paleoecology of large trepostome bryozoans from the Upper Ordovician, **Layali Banna ('22)** undertook an isotopic analysis of Bræðravirki Ridge, a tindar in Iceland, and **Syd Case ('22)** created an ArcGIS Dashboard to be used for ESCI data management. These interactions were fun, as Shelley was able to channel her inner paleontologist with Kate, relive the Team Iceland 2019 field season with Layali, and stretch her GIS capabilities with Syd.

Shelley also worked with six juniors on their Junior I.S. projects during the year, and she looks forward to continuing working with them throughout their senior year in 2022-2023. These students include: **Grace Braver ('23)**, **Matt Engfer ('23)**; mentored during his Iceland study abroad), **Ryan Johnston ('23)**, **Lauren Kreeger ('23)**, **Christopher Roche ('23)**, and **Ryan Sullivan ('23)**; shared mentoring with Meagen Pollock).

For a field geologist, things seemed nearly back to normal during summer 2022. Early in the summer, Shelley traveled to SW Utah with Mark Wilson, Nick Wiesenberg, **Lucie Fiala ('23)**, and **Vicky Wang ('23)**. Team Utah 2022 studied the Jurassic Carmel Formation, tackling both stratigraphic (Lucie) and paleontologic (Vicky) questions within the unit. This work extends previous research in the region by Wooster faculty and students.

After SW Utah, Shelley drove to central Utah to teach the first half of field camp for Ohio State. She was joined there by Wooster student **Grace Braver ('23)**, who attended field camp this summer. As usual, teaching in Utah was one of the highlights of her year.

In addition to finishing her second year as department chair, she continued to serve on a variety of worthwhile committees, both on- and off-campus. These committees included: one of two Wooster Faculty Athletic Representatives (FAR) to the NCAC and the NCAA (where she was selected as this year's NCAA DIII FAR of the Year, one of the highest honors of her professional life); the National FAR Conference Liaison to the FARA Executive Committee; Wooster Teaching Staff and Tenure Committee (TS&T); the Data Exploration and Communication Pathways co-liaison with Sofia Visa (Computer Science); the Ad Hoc Committee on Faculty Staffing; and the Urban Studies Curriculum Committee.❖



*Dr. Judge with **Justine Paul Berina** receiving his I.S. Symposium Award*

Meagen Pollock



Professor

B.S. Marshall University, 2001

Ph.D. Duke University, 2007

Wooster since 2008

In the fall of 2021, Meagen taught Natural Hazards and Earth Materials, and co-taught a first-year experiential learning course with Greg Wiles. Students in the experiential learning course explored the vast array of career opportunities in the geosciences and engaged with alumni to see what life is like in the profession.

Meagen mentored three Seniors and one Junior in Independent Study. **Layali Banna ('22)** used Pb isotopes to test the hypothesis that a sliver of continent exists under Iceland's Western Volcanic Zone. **Syd Case ('22)** developed a GIS dashboard for to archive department climate data and make it more accessible. **Leo Weeks ('22)** examined the effects of different tree species on soil carbon sequestration. **Judith Topham ('23)** proposed to study mineral chemistry in a glaciovolcanic ridge in Iceland. She will be using Oregon State's microprobe remotely in the summer to collect her data.

During the summer, Meagen and Greg co-led the AMRE Community Climate Project for early-career students and peer mentors, including Earth Sciences majors **Tyrell Cooper ('25)**, **Caitlyn Denes ('23)**, and **Desiree Smith ('25)**. This project is funded by the NSF-GEOPATHs program to establish a geoscience learning ecosystem that addresses community-oriented problems and increase representation in the geoscience workforce. She also worked with **Judith Topham ('23)** and **Jess Link ('25)** in the Wooster X-ray lab. The X-ray team analyzed minerals by XRD and SEM-EDS at Oberlin College.

Meagen started her yearlong research leave at the end of the fall semester. In that time, she co- led the AGU CUR workshop on creating and sustaining an undergraduate research program, presented in the STEM for All Video Showcase, and published an article in *Frontiers of Earth Science - Volcanology*. She is looking

forward to returning from her research leave in spring 2023 with fresh research and teaching ideas. ❖



Summer AMRE students, Caitlyn Denes '23, Desiree Smith '25, Kelvin Ansah '25, Fred Zhao '23, Tyrell Cooper' 25, and Junpeng Fu '23 with Dr. Pollock and Dr. Wiles



Our summer X-ray Tech team, Jess Link '25 and Judith Topham '23



Professor
Ross K. Shoolroy
Chair of Natural Resources
B.A. Beloit, 1984
M.S. SUNY Binghamton, 1987
Ph.D. University at Buffalo, 1992
Wooster since 1998

Gregory C. Wiles

In the fall, Greg taught Paleoclimate, Environmental Geology and a new course (co-taught with Dr. Pollock) designed for first-years entering STEM majors. He taught Hydrology and The World's Ice and Climate in the Spring. Seniors of 2022 I worked with and who completed their I.S. projects and are off on their next step in the geosciences include **Ricky Papay ('22)** who worked on a glacial history project in Alaska, **Justine Berina ('22)** (co-advised with Dr. Wilson) who completed a project involving diatoms and Browns Lake Bog and **Leo Weeks ('22)** (co-advised with Dr. Pollock) who examined the carbon sequestration potential of the dawn redwood trees. It was great to work with these students who brought new insights and techniques to climate studies at Wooster.

Meagen and Greg co-advised an AMRE (Applied Methods and Research Experience and funded by NSF) group this past summer - The Community Climate Project. The group consisted of four first-year students and **Caitlyn Denes ('23)** our excellent near-peer mentor. This project involved collecting data from many of our favorite sites around Wooster - Secret Arboretum, Spangler, and Johnson Woods. We worked with several stakeholders in the Wooster region, and the students will present their results at AGU this winter.

Greg traveled to Kake, Alaska with Nick Wiesenberg, **Lilly Hinkley ('25)** and **Wenshuo Zhao ('23)** to work with Native Alaskan Tlingit youths coring trees and learning about their culture. After two summers of working with several Tlingit youth groups online, it was great to work in person with everyone. Nick and Greg then met up with **Jack Whitehouse ('23)** and **Jacob Hassan ('23)** for a trip to Glacier Bay where they kayaked and explored portions of Muir Inlet collecting tree-ring data that we hope will span a crucial gap in our long tree-ring record from the region. Jacob and Jack will use aspects of this work for their IS.

projects. **Wenshuo Zhao ('23)** is exploring new methods of treating Alaskan subfossil wood for developing climate proxies using blue intensity tree-ring metrics for his IS. Also working on tree growth in Alaska, **Nivaan Lobo ('23)** is examining the ecological response of mountain hemlock trees with warming amplified by ice retreat at Columbia Glacier. Trees there are decreasing ring-widths as warming sets in, and he is working out the mechanism of the "decline". **Max Fletcher's ('23)** IS work involves fieldwork in August of this year with Nick and our collaborators at University of Alaska - Fairbanks. They will examine aspects of permafrost degradation and fire in the Arctic.

Caitlyn Denes ('23) is studying aspects of the ongoing pluvial in Northeast Ohio and the associated stormwater management issues that communities face in our region. This topic is one we have focused on in several classes as well as this past summer's AMRE project assisted by Caitlyn. Greg will also work with **Matt Engfer ('23)** who is working on a hydrology and flooding thesis in the coastal plain of North Carolina, work he began as a summer internship at East Carolina State.

Greg continues to serve as associate editor of *Tree Ring Research*, as a member of STATEMAP Advisory Council of the Ohio Geological Survey, on the Campus Tree Committee, and the Archaeology Curriculum Committee. He will be teaching Geomorphology and FYS in the fall and is on research leave in the Spring of 2023. ❖



Part of our NSF Alaska crew: Jacob Hassan '23, Nick Weisenberg, Jack Whitehouse '23, and Dr. Wiles



Professor
Lewis M. and Marian Senter Nixon
Professor of Natural Sciences
B.A. Wooster, 1978
Ph.D. Berkeley, 1982
Wooster since 1981

Mark A. Wilson

Mark was on a research leave during the fall and taught Sedimentology & Stratigraphy in the spring.

This year Mark had two Senior I.S. students, **Kate Runciman ('22)** and **Justine Paul Berina ('22)**. Kate studied the paleoecology and growth patterns of large trepostome bryozoans from the Upper Ordovician of the Cincinnati area. She became a master at making and interpreting acetate peels and thin-sections of these calcitic colonies, presenting her work before a meeting of the International Bryozoology Association and at the North Central-Southeastern sections joint meeting of the Geological Society of America in Cincinnati. By the fall of 2022 we hope that her observations and ideas are published. Justine worked on diatoms from Brown's Lake, a place well known to Wooster geologists. He established our diatom lab and a variety of sophisticated analytical techniques that will be followed by Wooster students for many years. He also presented his work at the sectional GSA meeting in Cincinnati.

Mark had four Junior I.S. students in the spring and summer. **Lucie Fiala ('23)** and **Shipei (Vicky) Wang ('23)** are studying the Middle Jurassic Carmel Formation in southwestern Utah. Lucie is examining a dramatic paleoenvironmental transition in the formation from supratidal to open shallow marine conditions, and Vicky is assessing the diversity, abundance and sizes of the trace fossils in the context of environmental restrictions. This summer Vicky and Lucie did fieldwork for their projects near St. George, Utah, directed by Mark and Shelley Judge, with the extraordinary logistical help of Nick Weisenberg. **Richard Torres ('23)** and **Addie Tagg ('23)** are following Justine with work on diatoms from Brown's Lake and elsewhere. Richard worked this summer on an NSF project with Mark and Greg Wiles (see below). He had a splendid trip through the Upper

Midwest with a University of Cincinnati team sampling a variety of lake systems.

Mark was a co-author of nine papers this year on topics from taphonomy (describing the preservation process of oommuration) to symbiosis in the Paleozoic and Mesozoic fossil record. Mark also co-authored a news article in the journal *Nature* describing the discovery of the first real Cambrian bryozoans. In addition, he began work with Principal Investigator Greg Wiles, Wooster students, and a team at the University of Cincinnati on a National Science Foundation grant project addressing the records of climate change and other environmental issues with Holocene lake and bog sediments.

Mark will teach Paleocology and History of Life during the coming fall semester. He will teach Sedimentology & Stratigraphy in the spring. ❖



Lucie Fiala '23, Vicky Wang '23, and Dr. Wilson on this summer's trip to Utah



Academic Administrative Coordinator
Departments of Earth Sciences,
Philosophy, and
The Pre-Law Advising Program
Wooster 2000-2022

Patrice Reeder

Patrice Reeder resigned from The College of Wooster in December, leaving her Scovel family and College friends of 20 plus years. She now works at Pepperl+Fuchs, in Twinsburg, Ohio, as the Administrative Assistant to the Director of Human Resources. She enjoys her 7-minute commute to work (vs. the one hour to the College) and being closer to her family. She and her husband Kevin enjoy living close to the Cuyahoga Valley National Park and the Cleveland Metroparks where they can fish and ride their bikes on the trails. You can connect with Patrice on LinkedIn or via email at patricereeder@yahoo.com. ❖



Academic Administrative Coordinator
Departments of Earth Sciences,
Philosophy, and
The Pre-Law Advising Program
Wooster since 2017

Broede Armstrong '07

Broede took over the Academic Administrative Coordinator's position in January 2022. Previously, she worked in the Registrar's office. She brings a broad knowledge of the campus and has been excited to get to know the workings of Scovel over the spring term. Broede enjoys the close relationships with students and faculty and cannot wait to complete her first year in the position. She is also looking into getting a coffee machine for the building, for everyone's safety. Her office is always open and she tries to keep the candy bowl stocked.

During the summer, Broede finally got to take a COVID-delayed research trip to Scotland with her mother. She also spent time outside with her husband, two sons, and two dogs. ❖



Departmental Technician
Wooster since 2009

Nick Wiesenberg

The position of Geological Technician within the Department of Earth Sciences is one which lends itself to being a person who wears many hats. Each day is often unlike the previous which makes coming to work both exciting and rewarding. Coupled with department faculty that are truly “rock solid”, it’s truly a dream job! Nick’s daily duties include maintaining the department’s equipment, conducting lab safety checks, keeping consumable items stocked, and working directly with students and faculty to ensure that Earth Scientists may remain focused upon their respective research projects. Nick is the curator for the College’s weather station, stream-monitoring equipment, and geographic information systems (GIS) image-based data collections at Fern Valley. He has received additional training in chemical safety, hazardous waste disposal and transport, operating GIS equipment and software, and wilderness first aid. Nick monitors and maintains the seismic station located on campus and is also in charge of archiving datasets, rock, mineral, and wood sample specimens for the department’s various disciplines. He assists students first-hand within the labs and the field with software, equipment usage and training as well as a diverse gambit of dendrochronological analysis and research.

Thankfully, with the onset of in person classes and fieldwork research projects, a state of relative normalcy resumed on campus and within the department throughout the course of the 2021/2022 academic year. Collaborations with colleagues from outside institutions ramped up as the semester gained steam, including contributions to publications by the

University of Cambridge (UK), Baldwin Wallace University, and Cleveland State University. Summer field work for senior IS projects resumed in St. George (Utah) with Dr's Judge and Wilson and in Glacier Bay National Park (Alaska) with Dr. Wiles and also saw Nick working in conjunction with the US Forest Service, COW students and faculty on a community outreach project with the youth of several remote native villages in Southeast Alaska including Kake, Hoonah, Angoon, and Kalwock. Nick continues to conduct ongoing climate research at Browns Lake in affiliation with The University of Cincinnati and will again be assisting Dr. Ben Gaglioti of University of

Alaska Fairbanks in August '22 with field work and tree ring analysis on black and white spruce to enable reconstruction of forest fire events within the Alaskan interior. Over the past year he has sampled approximately a dozen historic structures throughout Ohio to provide individuals with build dates on their old house, cabin or barn using tree-ring dating. Unraveling these mysteries is both exciting and rewarding. Nick enjoys spending his free time outdoors and is an active volunteer at Wooster Memorial Park, Vulture's Knob, and the City of Wooster.



Nick Wiesenberg and Jacob Hassan '23 kayaking in Alaska this summer.

Research Articles, Papers and Abstracts

College authors in bold.

- Berg, E., Kaufman, D. Anderson, R., **Wiles, G.** et al., 2022, Late-Glacial and Holocene Lake-Level Fluctuations on the Kenai Lowland, Reconstructed from Satellite-Fen Peat Deposits and Ice-Shoved Ramparts, Kenai Peninsula, Alaska: *Quaternary* 2022, 5(2), 23; <https://doi.org/10.3390/quat5020023>
- Ernst, A. and **Wilson, M.A.** 2021. Bryozoan fossils found at last in deposits from the Cambrian period. *Nature (News & Views)*. <https://doi.org/10.1038/d41586-021-02874-z>
- Gaglioti, B., Mann, D. and **Wiles G.**, 2022, Ecosystems at Glacier Margins Can Serve as Climate-Change Laboratories, *Geophysical Research Letters*, <https://doi.org/10.1029/2022GL098574>
- Vinn, O., Ausich, W.I., **Wilson, M.A.** and Toom, U. 2022. Did stalked echinoderms bioerode calcareous substrates? A possible boring crinoid attachment structure in a stromatoporoid from the early Silurian (Telychian) of Estonia. *Paläontologische Zeitschrift* (in press)
- Vinn, O., Ernst, A., **Wilson, M.A.** and Toom, U. 2021. Symbiosis in trepostome bryozoans from the Sandbian (Late Ordovician) of Estonia. *Historical Biology* 34: 1029-1038. DOI: 10.1080/08912963.2021.1959579
- Vinn, O., Ernst, A., **Wilson, M.A.** and Toom, U. 2022. Borings and bioclaustrations in bryozoans from the Kunda Regional Stage (Darriwilian; Middle Ordovician) of northern Estonia and NW Russia. *Neues Jahrbuch für Geologie und Paläontologie* 303: 219-225.
- Vinn, O. and **Wilson, M.A.** 2021. Evolutionary history of colonial organisms as hosts and parasites, p. 99-119. In: K. De Baets, J.W. Huntley (eds.), *The Evolution and Fossil Record of Parasitism*. *Topics in Geobiology* 50, chapter 4. (https://doi.org/10.1007/978-3-030-52233-9_4)
- Vinn, O., **Wilson, M.A.**, Isakar, M. and Toom, U. 2022. New bioclaustration of a symbiont in the mantle cavity of *Clitambonites schmidti* (Brachiopoda) from the Sandbian (Upper Ordovician) of Estonia. *Palaios* (in press).
- Vinn, O., **Wilson, M.A.**, Madison, A., Kazantseva, E., and Toom, U. 2022. First symbiotic association between hederelloids and rugose corals (latest Silurian of Saaremaa, Estonia). *Palaios* (in press).
- Wilson, M.A.**, Cooke, A.M., **Judge, S.A.** and Palmer, T.J. 2021. Ooimmuration: Enhanced fossil preservation by ooids, with examples from the Middle Jurassic of southwestern Utah, USA. *Palaios* 36: 326-329.

Zhang, Y-L., Lai, G-M, Gong, E-P., **Wilson, M.A.**, Huang, W-T., Guan, C-Q. and Yuan, D-C. 2022. Early Neoproterozoic well-preserved stromatolites from south Liaoning Province, North China: characteristics and paleogeographic implications. *Palaeoworld* (in press).

Abstracts

Abercrombie, C., Hodges, G., Wilson, L., Yoon, E., Braun, E., Leisher, K., **Chikomo, M., Banna, L., Pollock, M., Wiesenberg, N., and Wiles, G.** (2022). *The community water project: Student exploration of geosciences in the context of stormwater management in Northeast Ohio*. Geological Society of America.

Berina, J.P.A., Wiles, G., Wilson, M.A., Lowell, T.V., Diefendorf, A.F., Corcoran, M., Dietrich, W. and Wiesenberg, N. 2022. Unearthing the effects of European-American settlement on a northeast Ohio kettle hole through diatom stratigraphy. *Geological Society of America Abstracts with Programs*. Vol. 54, No. 4. doi: 10.1130/abs/2022NC-375005

Corcoran, M., Diefendorf, A., Lowell, T., **Wiesenberg, N., Wiles, G., Wilson, M.A.**, Dietrich, W. and Berina, J.P. 2022. Seasonality of hydrogen isotopes and concentrations of highly branched isoprenoids (hbi) produced by lake diatoms. *Geological Society of America Abstracts with Programs*. Vol. 54, No. 4. doi: 10.1130/abs/2022NC-374532

Corcoran, M.C., Diefendorf, A.F., Lowell, T.V., **Wiesenberg, N., Wiles, G.C. and Wilson, M.A.** 2021. Seasonal trends of hydrogen isotopes and concentrations of highly branched isoprenoids (HBIs) produced by lake diatoms. AGU Fall Meeting abstract, New Orleans.

Dietrich WL, Diefendorf AF, Lowell TV, Corcoran MC, **Torres, RC** (2022). *Diagenesis of a diatom biomarker*. Gordon Organic Geochemistry Conference. Plymouth, NH.

Gaglioti, B., Mann, D., **Wiles, G.** and Andreu-Hayles, L. (2022). *Holocene Records of the Aleutian Low Pressure System*. virtual Workshop on SE Alaska, and neighboring regions along the British Columbia coast, climate change, ice sheet dynamics, volcanic geohazards, Ice Age refugia, biodiversity, and biogeographic history.

Leland, C., D'Arrigo, R., Davi, N., Porter, T., Andreu-Hayles, L., Oelkers, R., **Wiles, G.**, Wilson, R., Anchukaitis, K., Rao, M., Gaglioti, B., Reid, E., Beaulieu, S., Nixon, T. (2022). *The Unidentified ~1809 Volcanic Event: Evidence from Tree Rings and Historical Data*. 6th Pages Open Science Meeting. Online.

Papay, R., Wiesenberg, N., Gaglioti, B., and **Wiles, G.** (2022). *The Glacial History of Wolf Lake Valley and the Development of a 4000 year Tree Ring Record in Glacier Bay National Park and Preserve, Alaska*. Geological Society of America. Cincinnati, OH.

Pollock, M., Schen, M., and Wiles, G. (2022). *A coordinated experiential learning program to broaden participation by enhancing self-efficacy, geoSTEM identity, and career awareness*. Earth Educators' Rendezvous.

- Runciman, K., **Wilson, M.A.**, Buttler, C.J. and **Judge, S.** 2022. Model of a biotic hard substrate community: paleoecology of large trepostome bryozoans from the Upper Ordovician (Katian) of the Cincinnati region, USA. Geological Society of America Abstracts with Programs. Vol. 54, No. 4. doi: 10.1130/abs/2022NC-374561
- Vinn, O., Ernst, A., **Wilson, M.A.** and Toom, U. 2021. New bioclastration in trepostome bryozoans from the Late Ordovician (Sandbian) of Estonia. Abstract for IGCP Project 653 meeting, Lille, France.
- Wiles, G.C.**, Gaglioti, B. and **Wiesenberg, N.** (2022). *Putting the Recent Pluvial into Context: Tree-Ring Records of Midcontinental North American Hydroclimate*. Geological Society of America. Cincinnati, OH.
- Wilson, M.A.**, Buttler, C.J. and Marengo, K.M. 2021. Studying fossil encrusting bryozoan astogeny and paleoecology with acetate peels of basal layers: a simple and fast non-destructive technique. International Bryozoology Association Australarwood X and Larwood Meeting, 29-30 September 2021, Programme and Abstracts, p. 46.
- Wilson, M.A.**, **Runciman, K.M.** and Buttler, C.J. 2021. Damage control in Late Ordovician trepostome bryozoans: recovering feeding surfaces lost to fouling by soft-bodied encrusters. International Bryozoology Association Australarwood X and Larwood Meeting, 29-30 September 2021, Programme and Abstracts, p. 45.
- Zhao, W.**, **Papay, R.**, **Wiesenberg, N.**, **Fiala, L.**, Gaglioti, B., and **Wiles, G.** (2022). *Voices in the Trees: Seeking Common Stories from Tree Rings in a Remote Collaboration*. The Geological Society of America. Cincinnati, OH.

Majors

Class of 2022

Layali Banna
Justine Berina
Sydney Case
Srushti Chaudhari
Mazvita Chikomo
Wylie Greeson
Richard Papay
Kate Runciman
Leo Weeks

Lakewood, OH
Legazpi, Philippines
Lakeville, MN
Pune, India
Harare, Zimbabwe
Alexandria, VA
Wadsworth, OH
Guelph, Canada
Greencastle, IN

Class of 2023

Grace Braver
Caitlyn Denes
Matt Engfer
Lucie Fiala
Max Fletcher
Noah Fox
Jacob Hassan
Ryan Johnston
Lauren Kreeger
Nivaan Lobo
Michael Paskus
Christopher Roche
Ryan Sullivan
Adeline Tagg
Judith Topham
Richard Torres
Vicky Wang
Jack Whitehouse
Wenshuo Zhao

Wadsworth, OH
Aliquippa, PA
Libertyville, IL
Skokie, IL
Bethesda, MD
Athens, OH
Steubenville, OH
Southington, OH
Howell, MI
Ojai, CA
Ann Arbor, MI
Wooster, OH
Amesbury, MA
Pittsburgh, PA
Greensboro, NC
Fall River, MA
Beijing, China
Asheville, NC
Santa Fe, NM

Class of 2024

Van Beaver
Hudson Davis
Atlas Dwyer
Corey Knauf
Garrett Roberson
Jameson Sprankle
Athena Tharenos
Emma Van Amburgh
Ainsley Wiesner

Radnor, PA
Fort Bragg, CA
Madisonville, KY
Vienna, VA
Roswell, GA
Shreve, OH
Saint Louis, MO
King Ferry, NY
Lake Forest, IL

Class of 2025

Lilly Hinkley
Hayden Jacoby
Jess Link
Desiree Smith

Miamisburg, OH
Carey, OH
Readfield, ME
Wooster, OH

Class of 2022



Layali Banna



Justine Paul Berina



Sydney Case



Srushti Chaudhari



Mazoita Chikomo



Wylie Greeson



Richard Papay



Kate Runciman



Leo Weeks

Achievements/Activities of our Majors

Class of 2022

Layali Banna

Geology Club, President

Poster Presentation at GSA Annual Meeting (Portland, OR)

Copeland Funding Recipient

This summer, Layali will be taking a much-earned gap break and then will be starting employment.

Justine Paul Berina

Served as a research assistant for Dr. Judge and Team Utah

Played the piano at the 2021 Culture Show

Received the Robert W. McDowell Prize in Geology for earning the highest GPA among Earth Sciences majors in my junior and senior years

Won the Best Explained Technical Project Award at the 2022 Senior Research Symposium

Since graduation, Justine has been employed as a staff engineer at Langan, in Arlington, Virginia; working towards my professional geologist (PG) license.

Sydney Case

Women's Volleyball, student assistant coach

Women's Volleyball, strength coordinator

Geology Club member

This summer, Sydney plans to coach youth and junior volleyball and spend time with family and friends. She will also take some Earth Sciences courses to prepare for her graduate studies.

This fall, Sydney will be attending North Carolina State University as a research/graduate assistant. While serving as a research assistant and TA for undergraduate courses, she will be earning a Masters of Natural Resources: Assessment and Analysis as well as a certificate in Geographic Information Science.

Srushti Chaudhari

College of Wooster Resident Assistant

Libraries Access Services Student Assistant

Senior Peer Mentor

Wooster Women and Gender Minorities in Economics, Co-President

This summer, Srushti plans to travel before seeking employment.

Mazvita Chikomo

International Student Scholarship Recipient

Mrs. Alva C. Bailey Scholarship Recipient

Theodore Williams Scholarship Recipient

Donald R. Coates Endowed Geology Scholarship Recipient

Association for Women Geoscientists (AWG) Geoscience Inclusion, Diversity, Equality and Accessibility (IDEA) Scholarship Recipient
Copeland Funding Recipient
Experiential Learning Student Award Recipient
Phi Beta Kappa Prize Recipient
The Robert W. McDowell Prize in Geology Recipient
Poster presentation at GSA Annual Meeting 2021 (Portland, OR)
Oral presentation of research at GSA Northeast Central Section meeting '22 (Cincinnati)
Live Oral presentation, IS Symposium
STEM Success Initiative, Intern
STEM Zone Intern, Ice Water and Climate- Spring Semester
Peer Mentor
African Student Union, Co-President
Geology Club, Vice President
Ebert Building Monitor Alternate
Senior Admissions Intern
Future Alumni Network Club
This fall, Mazvita will be pursuing a PhD at Rutgers University (New Brunswick) in Earth and Planetary Science.

Wylie Greeson

Richard Papay

Student worker, Tree Ring Lab
This summer and fall, Richard will focus on finding employment

Kate Runciman

College of Wooster Pipe Band, Pipe Sergeant
Wooster Ballroom Club, President
Geology Club
Knot Another Fiber Arts Society
Sed Strat Teaching Assistant
This summer, Kate will be performing in the Royal Edinburgh Military Tattoo in Edinburgh, Scotland. She will also be enjoying a canoe trip.
This fall, Kate will be attending graduate school.

Leo Weeks

Geology Club Treasurer
College Democrats Treasurer
Men's Ultimate Frisbee member
Employed at Buehler's Milltown
This summer, Leo will volunteer at Earth Charter Indiana and continue to work with local communities toward local climate resolutions, including their hometown of Greencastle. He will continue to work in the Garden Center of Lowe's but is also hoping to travel and spend time with loved ones.
This fall Leo will be attending Indiana University's School of Public and Environmental Affairs. He will be a part of the Master of Environmental Science Master of Public Affairs dual degree program.

Class of 2023

Grace Braver

Caitlyn Denes

STEM Zone Intern

Peer Mentor

Geology Club, President

Teaching Assistant

Delta Phi Alpha Honor Society

This summer, Caitlyn will work as a Peer Mentor with the Earth Science's department's AMRE Team, working on starting Senior I.S., and traveling with family.

Matt Engfer

Lucie Fiala

Max Fletcher

Jacob Hassan

Ryan Johnston

Varsity Football

Varsity Track

Office of Admissions Lead Tour Guide

Men Working for Change, President

Phi Sigma Alpha, President

Student Intramural Director

Admissions Guest Service Specialist

Inter-Greek Council, President

Geology Club

Color Commentator

This summer Ryan will be participating in his second season in an internship at Great Basin National Park. He will be working as an interpretation park ranger giving cave tours, participating in search and rescues and fire mitigation, and continuing to provide other programming to park visitors. He will also be researching Cave Turnips for his Independent Study while there.

Lauren Kreeger

GeoClub Member

Recipient of the Karl ver Steeg Prize in Geology

This summer Lauren will be participating in the Research Opportunities in Rock Deformation (RORD) Research Experiences for Undergraduates (REU).

Nivaan Lobo

Michael Paskus

Christopher Roche

Ryan Sullivan

Adeline Tagg

Varsity Softball, NCAC Honorable Mention

Student Intramural Manager

Completed Junior I.S. research on the role of Diatoms during a climate event at Brown's Lake

This summer Addie is interning with Atlas Technical Consultants in Pittsburgh, PA where she is completing Construction Materials Testing around western PA. After graduation Addie has been invited back by Atlas to continue work on a Geotechnical Path.

Judith Topham
Richard Torres
Vicky Wang
Jack Whitehouse
Wenshuo Zhao

Class of 2024

Van Beever
Hudson Davis
Atlas Dwyer
Corey Knauf
Garrett Roberson
Jameson Sprankle
Athena Tharenos
Emma Van Amburgh
Ainsley Wiesner

Class of 2025

Lilly Hinkley

COW Dance Company

Women's Ultimate Frisbee Team, Treasurer

Sophomore Research Assistant for Dr. Wiles, conducting a dendroclimatic analysis on a set of tree cores from Alaska.

Donaldson Prize for a Critical Essay Recipient

Donaldson Prize for a Personal Essay Recipient

Dean's List

This summer I traveled to Alaska with Dr. Wiles, Nick, and Fred to conduct tree ring research.

We primarily worked in Kake, Alaska, with a group of teens to educate them more about tree rings and what they can tell us.

Hayden Jacoby

Beta Kapp Phi, member

Varsity Track Team, member

Jess Link

Desiree Smith



Paleoclimate Class

Leo Weeks ('22)



Junpeng Fu and Fred Zhao ('23s)

Scholarships and Awards



The Karl Ver Steeg Memorial Scholarship is in honor and memory of Karl Ver Steeg, who taught in the Department of Geology from 1923 until 1952. It is awarded annually to a deserving student who is majoring in Geology. This year's recipient was **Kate Runciman ('22)**.

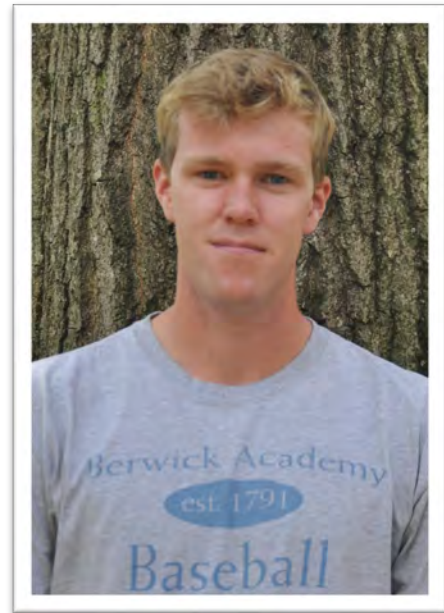
The Robert W. McDowell Prize in Geology was established in 1945 by **Philip C. ('14)** and **Sarah Wright McDowell ('14)** in memory of their son, **Robert W. McDowell ('45)**, who lost his life in World War II. It is awarded annually to the geology major who has the highest general standing during the junior and senior years. This year's recipients were **Justine Paul Berina ('22)**, **Sydney Case ('22)**, and **Mazvita Chikomo ('22)**.





The Margaret Reed and John O. Clay Endowed Scholarship was established in 1985 by John R. Clay, the son of **Margaret ('45)** and **John Clay ('43)**. This scholarship is awarded annually to a student who has demonstrated academic achievement. This year's recipient was **Caitlyn Denes ('23)**.

The Frederick W. and Ruth Perkins Cropp Scholarship was established in 1978 by family and friends to honor the late Mrs. Cropp, class of 1925, and the late Dr. Cropp, class of 1926, for their lifetimes of Christian service. This year's recipient was **Ryan Sullivan ('23)**.



The Karl Ver Steeg Prize in Geology and Geography, established in 1958, honors Karl Ver Steeg who taught in the Department of Geology and Geography from 1923 until 1952. This prize is awarded annually to the Geology major who has the highest general standing at the middle of the Junior year. This year's recipient was **Lauren Kreeger ('23)**.

The Don J. Miller Memorial Fund was established in 1961 by the family and friends of Don J. Miller, of the class of 1940. In recognition of Mr. Miller's devotion to the science of geology, the scholarship which this fund provides is awarded annually to a student who is majoring in geology. This year's recipient was **Lucie Fiala ('23)**.



The Charles B. Moke and Margaret Kate Moke Endowed Scholarships were established in December of 1983 with a generous donation provided by **Fritz Kate ('38)**, Margaret's brother. These two scholarships are awarded annually to Geology majors who have distinguished themselves by dedication to quality in their academic work, have demonstrated self-reliance, and have a

sincere interest in and a concern for other people, characteristics which were exemplified by Charlie and Margaret Moke. This year's recipients were **Layali Banna ('22)** and **Leo Weeks ('22)**.



The Charles B. Moke Prize is given in memory of **Charlie Moke ('31)** who taught in the Department of Geology for 36 years. The prize consists of a field instrument or device which is awarded to the graduating senior who plans to make Geology a vocation and who, in the judgment of the Geology staff, has shown the greatest improvement during his or her college career. This year's recipient was **Kate Runciman ('22)**.



The Frederic Kent Warner Endowed Scholarship Fund was established in 1986 by family and friends in memory of **Fred Warner ('76)**. Fred, originally from Orrville, Ohio, was killed in 1985 in a helicopter crash en route to an off-shore Alabama oil rig to examine a core while working for ARCO. This scholarship is awarded annually to a Geology major. This year's recipient was **Richard Torres ('23)**.

The Robert A. Piscetta #31 and Wilson Sporting Good Endowed Scholarship was established in 2018 by Colleen McCauley Piscetta, a member of the class of 1989, and Wilson Sporting Goods Company to honor the memory of Robert A. Piscetta, a member of the class of 1987. While at Wooster, Rob majored in geology under the mentorship of Dr. Mark Wilson and was a standout pitcher for the Fighting Scots Baseball Team under Coach Tim Pettorini. After graduation, Rob was drafted as a pitcher by the Los Angeles Dodgers and then went on to a 19-year career with Wilson Sporting Goods, where he worked his way up from Ohio Territory Manager to Vice President. The scholarship carries the #31 because this was Rob's favorite number which he wore while playing baseball for The College of Wooster and the Los Angeles Dodgers. Income



from the fund shall be awarded each year by the Department of Financial Aid, working in conjunction with the Department of Earth Sciences, to an upper-class geology major who has demonstrated financial need. Preference shall be given to a student who has a cumulative GPA of 3.0 or higher. This year's recipient was **Jessica Link ('25)**.



Geology Club

2021-2022 Geology Club Officers were President, Layali Banna; Vice President, Mazvita Chikomo; Treasurer, Matt Engfer; Public Relations, Leo Weeks; and Outreach, Caitlyn Denes.

2022-2023 Geology Club Officers will be President, Caitlyn Denes; Vice President, Lauren Kreeger; Treasurer Matt Engfer; Social Media Tyrell Cooper; and Outreach, Grace Braver.

Geology Club Presentations

Fall Semester

August 20	Welcome to GeoClub. Introduction of GeoClub Officers
August 27	Introduction for Everyone: Autobiographical slides
September 2	Welcome Back! – First Meeting and Photos
September 9	GeoClub – Come get to know us!
September 16	What our members did this summer
September 23	SSI Takeover: Effective Learning Strategies with Dr. Stavnezer
September 30	Stressed Out? Group Meditation
October 7	Alumni Panel – Sarah McGrath '17 and Kamilla Fellah '08
October 28	SSI Takeover: Stem Career Panel with Dr. Alejandro Relling and Mary Sefcik
November 4	Senior IS Presentations: Mazvita Chikomo, Justine Paul Berina, and Srushti Chaudhari
November 11	Senior IS Presentations: Layali Banna, Syd Case, and Ricky Papay
November 18	SSI Takeover: Stem Summer Internship Panel
December 2	Senior IS Presentations: Kate Runciman and Leo Weeks , and Junior IS Presentation: Judith Topham

Spring Semester

- January 20 General Welcome and Nominations for 2022-2023 GeoClub Officers
- January 27 Interested in Studying Abroad? Hear from students **Matt Engfer** and **Lucie Fiala** speak about their study abroad experiences in Iceland and Copenhagen/Greenland
- February 3 Dr. Wilson comes to speak about his research leave and other fun activities [this meeting had to be cancelled due to COVID-19 restrictions]
- February 10 Interested in Fossils? Hear from **Dr. Mark Wilson** about “A Different Kind of Fossil Preservation
- February 17 “What can you do with a Geology degree?” Featuring **Will Santella ‘21**
- February 24 The STEM Success Initiative Presents: STEM Alumni Panel with Sophia Anderson, MB, Dr. Elizabeth Ayisi, and Dr. Diane Young
- March 3 Senior IS Presentations: **Kate Runciman, Ricky Papay, and Mazvita Chikomo**
- March 10 Senior IS Presentations: **Leo Weeks and Layali Banna**
- March 31 Senior IS Presentations: **Syd Case and Srushti Chaudhari**
- April 14 Senior IS Presentation: **Justine Berina**
- April 21 Earth Day Celebration: Join us for Earth Day Trivia!
- April 28 Junior IS Presentation: **Ryan Johnston**
- May 5 Junior IS Presentations: **Lucie Fiala, Addie Tagg, Richard Torres, and Vicky Wang**

Senior Independent Study Abstracts

Layali Banna

Tracing Source Material for Bræðravirki Ridge through Isotopic Analysis

Iceland has been the subject of many studies as it is one of the most tectonically active areas in the world. While the tectonically active regions of Iceland are studied in depth, areas like the Western Volcanic Zone (WVZ), which is not as tectonically active, are not studied as much. This is truer for small formations like tindars. One of these understudied tindars is Bræðravirki ridge, a small 3 km long hyaloclastite tindar located off the flank of Okjökull shield volcano. Previous studies were done there by College of Wooster alums Simon Crawford-Muscat and Hannah Grachen, where they found that

Bræðravirki had an odd geochemical signature. During the previous research extremely rare quartz phenocrysts were also found in samples from Bræðravirki. The main focus of this study is to find the source of the odd geochemical signature and quartz phenocrysts, and to do this an isotopic analysis of Bræðravirki was done. The isotopic analysis found that Bræðravirki was not the result of continental crustal contamination. Bræðravirki is more likely the result of assimilating rhyolitic material from the surrounding area or hydrothermally altered basalt, but more research is necessary. ❖

Justine Paul A. Berina

Unearthing the effects of European-American settlement on a northeast Ohio kettle lake through diatom stratigraphy

Recently, wetland conservation has highlighted the necessity for assessing limnological changes following European-American settlement. A prior study at Brown's Lake (northeast Ohio) identified a stratigraphic sequence that shows an abrupt transition from organic-rich muds to several centimeters of a bright loess layer, then a recovery to organic-rich sediments near the top. Based on ^{210}Pb dates, the loess deposition occurred before 1846 CE, when a growing population cleared trees and farmed intensively. Likewise, organics had recovered after 1950 CE, when people abandoned farmland and practiced conservation tillage. However, the effects of settlement on limnology are poorly known. Diatoms (microscopic algae; class Bacillariophyceae) respond to modifications in water quality and habitat parameters, and siliceous cell walls enable preservation in sediments as fossils. Therefore, a diatom stratigraphy can record the lake's

limnological history. A 1-m sediment core was extracted using a modified-Livingstone sampler and dated using AMS radiocarbon dating. A total of 380 cells from the core were analyzed. The data reveal shifting relative abundances that coincide with settlement activities. Before 880 CE, *Thalassiosira* sp., a non-motile genus, is dominant, making up 22.1% of diatoms. Between 880 CE and 1950 CE, *Achnantheidium* sp., a motile genus, is abundant, making up 25.0% of diatoms. It has been noted that the replacement of planktonic genera by diatoms capable of moving through fine sediments suggests a time of excess siltation. From 1950 CE to the present-day, *Cyclotella* sp., a non-motile genus, is dominant, making up 30% of diatoms. Despite these associations, the data cannot provide evidence of a cause-and-effect relationship due to confounding variables (e.g., climate, habitat availability, and structures), errors, and limitations. This study offers the first catalog of historical and modern diatom assemblages at Brown's Lake to support conservation initiatives. ❖

Sydney Case

Creating an ArcGIS Dashboard for Climate Data Management and Visualization

The College of Wooster Department of Earth Sciences has collected over the past 12 years (and continues to collect) hourly local climate indicator data, including stream level and temperature, air temperature and pressure, precipitation levels, and relative humidity. This data is collected at the College's research station, Fern Valley, located in Holmes County, Ohio and serves as a storytelling component for regional climate change. Upon initial investigation, the extensive dataset revealed a fundamental data storage problem within Earth Sciences, as there lacked a singular location to store complex datasets. Several technological solutions were explored to create a long-term data storage, management, and visualization solution. These solutions included establishing an ArcGIS enterprise geodatabase, restructuring the current local server architecture at The College of Wooster, and creating an online group through ArcGIS Online, all with the eventual goal of constructing an ArcGIS Dashboard as a data visualization tool. Although the enterprise geodatabase was (and remains) the most efficient and streamlined solution to the problem, time constraints and data limitations prevented the implementation of

an enterprise software structure. Adapted from the enterprise geodatabase theory, an online group was formed by The College of Wooster database administrator that enabled a partial multiuser data sharing experience. After being faced with further data limitations when using the online group, an alternative solution was pursued that incorporated two separate data upload strategies: geoprocessing via web layer sharing in ArcGIS Pro and hosted layer uploading in ArcGIS Online. Following the data upload, the Fern Valley Climate Data Dashboard was created. The dashboard is currently active and utilizes a tactical strategy, incorporates intentional element selection, supports deep interactivity, and enhances the overall user data visualization experience. Though partially limited, the dashboard serves as an excellent representation of the potential ArcGIS Dashboards has for transforming traditional data management and visualization solutions. Considering future exploration of ArcGIS Dashboards as a data management solution in the future is recommended for The College of Wooster as it would provide opportunities for holistic data visualization, cross-organizational multiuser collaboration, and multidisciplinary educational advancements. ❖

Srushti Chaudhari

Analyzing the effects of climate change on glacier loss in the Himalayan region and the agriculture economies of the Indo-Gangetic Plains using GIS techniques

The glaciers in the Himalayan Range are vital freshwater repositories that contribute to the discharge of major rivers such as the Indus, Ganges, and Brahmaputra rivers. Rising temperatures and unpredictable precipitation patterns in the Himalayan region as a result of climate change influence this rate of glacial melt. Since these rivers flow across historically disputed political boundaries in South Asia, the changes in the cryosphere due to climate change will impact the already fragile political stability of the region. This study uses Geographic Information System (GIS) techniques to track glacial melt trends in the Himalayan region. Since the South Asian Monsoon is also a vital component of the overall climatic system, temperature and precipitation trends are also visualized to depict the relationship between the two in the Indus-Ganges-

Brahmaputra watersheds. The results show that the mass balance of the glaciers has decreased from -0.21 during 1975-2000 to -0.41 during 2000-2016, signifying that more glaciers in the region are melting, and they are melting at a faster rate. Concurrently, the temperature and fluctuations in temperature have been increasing in the downstream regions, while the precipitation shows an overall decline. This has socio-economic and political implications as the communities that lie downstream are dependent on the river discharge for agricultural, industrial, or municipal needs. Furthermore, since these are largely agriculture dependent economies, these changes negatively affect the livelihoods of a large part of the population. South Asian countries therefore face the daunting task of navigating water scarcity in the face of climate change and increasing competition due to rising water demands. ❖

Mazvita Marilyn Chikomo

Modeling Meets Mirror Lake: How Highly Urbanized Areas Influence Surface Water – Groundwater Interactions at The Ohio State University, Columbus, Ohio

Water plays a vital role in sustaining life, and the availability or lack of it shapes how communities thrive and behave. As societies industrialize and urbanize, waterbodies for aesthetic purposes increase, and this may alter surface water-groundwater interactions. This study aims to look at the impacts of water use and management on a large university campus, The Ohio State University (Columbus, Ohio USA), at a treasured recreational lake and how it influences the groundwater system through groundwater modeling. Utilizing available topographic and climatological data along with ground-based water level measurements, we model seasonal changes in groundwater storage and lake-

groundwater exchange using MODFLOW 6. Preliminary model results of a simplified overview of annual flow agrees reasonably well with observed heads. Discrepancies are likely due to complex geology and the presence of a dense urban infrastructure like storm sewers that influence groundwater flow. The lake loses approximately 432 cubic meters of water to the aquifer daily ($0.005\text{m}^3/\text{sec}$), and as a result, must be fed by a steady supply of new water. For context, these losses are equivalent to the daily domestic water needs of approximately 1768 college students. These results provide new insights into water resources on an urban campus and the complex surface water-groundwater interactions in heavily modified human spaces. ❖

Richard Papay

The Glacial History of Wolf Lake Valley and the Development of a 4000 Year Tree Ring Record in Glacier Bay National Park and Preserve, Alaska

Over the past several decades, glacially overrun wood has been collected from Glacier Bay National Park and Preserve, Alaska, for developing long tree ring records. Annually dated tree ring chronologies are records of climate, essential to radiocarbon calibration, and are increasingly important in identifying the calendar year of cosmic events. Glacier Bay has been undergoing ice retreat since roughly 1750 CE, leaving behind buried wood that can extend our chronologies further into the past as well as track past glacial movements. A recent collection of 87 samples of sub fossil wood from Wolf Lake in the East Arm of Glacier Bay adds detail to the regional glacial chronology as well as increasing sample size in our tree ring record. Tree ring dating of the Wolf Lake collection indicates that the region was either abruptly run over by ice about 2 ka, or the forests were killed by an extensive phase of Muir Lake dammed by the advancing West

Arm. Analyses of the spatial pattern of the tree-ring dates along with previous reports in the region will contribute to better understanding the glacial history. Currently, a ~200-year gap between the ring width calendar-anchored chronology (2.2 ka to present) and a floating ring width chronology prevents this series from being continuously dated back 4000 years. The samples were taken with the hope that this gap would be crossed, as the glacially overrun wood would be dated approximately to the time of the gap. The samples did prove useful in increasing the sample size and extending the chronology further into the past, as well as adding detail to the glacial chronology of the region. Additional work using radiocarbon wiggle-matching and identification of a cosmic event about 2.6 ka may assist in future efforts to calendar date the series. ❖

Kate Runciman

Model of a Biotic Hard Substrate Community: Paleoecology of Large Trepostome Bryozoans from the Upper Ordovician (Katian) of the Cincinnati Region, USA

The calcite skeletons of trepostome bryozoan colonies from the Upper Ordovician (Katian) of the Cincinnati region record the diverse interactions and growth responses these colonies experienced. Trepostome specimens from three Cincinnati strata, the Bellevue Member, the Bull Fork Formation, and the Whitewater Formation, were studied within this project. These three strata were deposited in a shallow epicontinental sea environment that was located in the southern subtropics, approximately 20-23°S at the time of deposition. The focus of this project was the paleoecology of large trepostome bryozoans, which was studied by examining bryozoan growth patterns, trace fossils, and sedimentation. Microscopic examination of these features was conducted by sectioning colonies and making acetate peels and thin sections. Through this examination many trace fossils were found, with *Trypanites* borings being the most common. These borings often contained calcite "ghosts" and appear to have been excavated mechanically by a worm such as a sipunculan or phoronid. A subset of the observed borings prompted growth reactions in their host bryozoan, indicating that these borings progressed through a live portion of the colony. Growth reactions served to seal the cavity and regain

feeding surfaces by: (1) Zooids surrounding the cavity growing upwards and angling inwards, creating a "tent" with the cavity closed off; (2) Zooids growing laterally over the cavity opening, sealing it off with a flat "roof"; or (3) Zooids budding down into the cavity then angling upwards, filling in all open space and resuming a feeding surface above. Other features observed in the trepostomes studied include calcite tubes, which are interpreted as fossil cornulitids; a tube and holdfast, interpreted as a sphenothallid; and prismatic calcite features, which are interpreted as the remains of aragonitic shells. All colonies and trace fossils included in this study were infilled with one or more of: sparry calcite cement, dolomite rhombs, biosparite, micrite, prismatic calcite, and phosphate. This range of infilling materials suggests that infilling processes were episodic. The episodic nature of these processes allowed for the preservation of ghosts and occasionally geopetal structures. Internal surfaces were observed that indicated regions of self-overgrowth in the colony. These self-overgrowths were commonly associated with brown bodies. Work continues to combine insights provided by the trace fossils, growth responses, and infill observed in the Cincinnati trepostomes to interpret the ecology and life modes of these bryozoans. ❖

Leo Weeks

*Carbon Storage Capacity and Potential of *Metasequoia glyptostroboides* to Serve in Urban Forests at Secret Arboretum in Wooster, Ohio*

Forests' ability to store carbon has caught the attention of many seeking to limit greenhouse gas emissions. Given widespread demographic shifts of urbanization (Ritchie and Roser, 2018), urban forestry's role as the intersection of forests and cities grows more important. Research in this new field, urban forestry, has started to link the effect of a specific tree species to the above and belowground carbon storage capacity (Agbelade and Onyekwelu, 2020). As the first look into carbon storage of the *Metasequoia glyptostroboides* species, this study aims to connect tree species selection at the Ohio Agricultural Research and Development Center's (OARDC) Secret Arboretum in Wooster, Ohio to carbon storage. The conclusions of this type of study will serve

pivotal forest management and urban planning decisions. The *Metasequoia glyptostroboides* species modern existence is connected to international conservation efforts that disseminated the previously thought to be extinct tree around the globe. International conservation led the tree to Wooster, where this study's partial above and belowground carbon budget of the 22-tree plot at the Secret Arboretum occurs. The hypothesis that *Metasequoia glyptostroboides* would provide effective carbon storage, among other ecosystem services, is supported by soil sample analysis and iTree modeling. Inclusion of *Metasequoia glyptostroboides* in future urban forests provides considerable carbon storage, as well as nitrogen and organic matter storage, air pollution removal, and runoff avoidance.

❖



Alumni News

Robert Sponseller ('58) - We were sad to hear from Robert's son, Daniel Sponseller ('88), that Robert passed away. However, Daniel let the department know that several of his father's papers and mementoes were donated this year through the Alumni Center to the College's Special Collections. ❖

Stan Totten ('58) - "Skipping twenty years of retirement, 2022 has been eventful and it is still May. My proposal of the mastodon as Indiana's state fossil was approved in February to be effective July 1. I presented two papers at the Cincinnati GSA meeting in April. My Memorandum proposing the T.rex as national fossil reptile and the mastodon as national fossil mammal was published in the May issue of GSA TODAY. My biography of Charles Whittlesey is scheduled to be published in June by the Kent State University Press." ❖

Steven Emerson ('69) - Dr. Steven Emerson is a professor of Oceanography at the University of Washington and generously donated a copy of his new book *Chemical Oceanography: Element Fluxes in the Sea* (Cambridge University Press, 2022) to our Timken Science Library. ❖

Richard Peterson ('72) - I cannot believe that I have been retired from teaching for 23 years. Where has the time gone? One day seems much like another unless I schedule an activity. Reading and pursuing my stamp collecting hobby gives me much joy day to day. My wife Elaine and I took another Viking cruise this year; it's getting to be a habit. She has always wanted to go to Alaska ever since she was in Elementary school when Alaska became a state in 1959. The 12 days we spent cruising the inland passage and the land excursions were fabulous. She keeps saying, "I got to stand on a glacier" before they all disappear. I've already planned our next trip back to Europe for 2023. Keeping active is important, but my 90% disability from the Vietnam conflict has limited me physically. My mind is still sharp, so they say. Talking to David Wilkins and Roy Hayes from time to time has been a pleasure. My geology professors have all gone to the "great Fossil Exhibit" in the sky; Dr. Moke, Dr. Osgood. I enjoyed the short time that I was at COW, having transferred my credits from Wisconsin after I got out of the Air Force in 1969. Field trips were the best, so when I began my teaching career, I decided to use a hands-on approach. I used Saturdays for voluntary trips which I called the "Geologic Tour of Wayne County" exposing the students to landscape features. They didn't have a clue as to why Wayne County is such a rich agricultural phenomena. The year after I took Fred Cropp's 9 day trip rafting the Grand Canyon, I took 4 teenagers on a five week trip visiting western Parks and Monuments. A few had never been out of the County before. There are many happy memories and I still keep in touch with a few of these students. I graduated (i.e. retired) after 33 years in the classroom. ❖

Gerald "Jerry" Weisenfluh ('75) - I've been retired since 2017 from the Kentucky Geological Survey (interim Director) and remain in Lexington, Kentucky with my wife Sherri. I've been doing a lot of volunteer work with water quality monitoring and stream/forest restoration in our area. I've had two big events this year. First, Sherri and I adopted a young woman from Panama who we had been a host family for while she was attending university locally. She just

completed a degree in diplomacy and international development, and is still close by while looking for that dream job. The second big event was that I received a cochlear implant in April. I've had severe hearing loss since my mid-20s, and this was the last option for my left ear. It's been an amazing process of rehabilitation, and I'm doing better than I ever imagined. ❖

Jim Clough ('75) - On July 8, 2022 **Jim Clough** (Class of '75) and **Curt Freeman** (Class of '78) met at lunch for the *Farthest North - Wooster Earth Sciences Dept Alumni Meeting*. A fun and lighthearted time was had by all as we reminisced about our great times at Wooster, our geology classes and professors, and our geology careers in Alaska. Following are a few recollections among the many we enjoyed discussing and are now sharing with our Wooster Geosciences alumni colleagues.

As shared at lunch with Curt, when I left high school in June of 1971, my plans were to study political science in the fall at Wooster with the intention of becoming a lawyer and leaving all science, and particularly math far behind me! I pursued this course of study through my Freshman and most of my Sophomore year at Wooster, BUT I had to take a science class to meet my core curriculum at Wooster. So, I signed up for Geology 101 for the 3rd quarter Sophomore year, partially because I enjoyed collecting rocks as a child, I even had a rock hammer, and I thought the class would be fun. I walked into Scovel Hall on the first day of classes, not knowing what to expect, and up at the front of the classroom was Dr. Charles Moke. After a brief introduction, he threw up a slide on the screen and proceeded to talk about it. Slide after slide followed, some he talked about for a minute or two, and a few for much longer. And in every slide there was a geologic story, that Charlie spoke about with great interest and passion. To say the least, I was enthralled, listening intently, and by the end of that very first class I was hooked, as Charlie Moke had rekindled my childhood enthusiasm for geology and science. I was eager to and immediately changed my major to Geology, thereby having to cram all of the geology, and requisite chemistry, physics and math classes into two years to graduate on schedule. But it was well worth it, as I went on to graduate school in Alaska and a career in the most interesting profession in the world.

Looking back, and interestingly for me, I was taught the "Theory of Continental Drift" during my junior year. It was still just a theory then (believe it or not) and we were taught about Geosynclinal theory- miogeosynclines, eugeosynclines etc. but it was confusing and the mechanisms for mountain building never seemed to make sense! And then suddenly, like the Cambrian explosion, plate tectonics rapidly emerged and suddenly everything fell into place and made sense. This, along with sequence stratigraphy that I learned in graduate school and beyond, sure made unraveling earth's mysteries so much easier!

On a return visit to Wooster in January of 1977 I was home to Cleveland on Christmas break and I drove down to Wooster to visit my old haunts. I saw Dr. Richard Osgood, who had been my advisor at Wooster. And he asked me to have lunch at Kittridge with Curt Freeman and several other prospective Geology majors. Curt was particularly interested because he was thinking of going to the University of Alaska for graduate school. At lunch I told Curt about the graduate school and the opportunities for geologists in Alaska. And despite my also telling Curt what a horrible place it is and no one should ever go there, he arrived for graduate school in the fall of 1978. Over the years we've enjoyed seeing each other in Fairbanks and it always seems a part of our conversation comes around to our time at Wooster.

After 40 years of geology in Alaska including 34½ years as a Geologist with the State of Alaska - Geological & Geophysical Surveys I retired at the end of July 2015. I am still keeping

my feet “wet” in geology as an Affiliate Professor in the Petroleum Engineering Dept. at the University of Alaska Fairbanks where I mentor graduate students and help obtain funding; and also doing some geologic consulting for my own LLC company. ❖

Jeff Yahn ('76) - Found this past year on my gold mining claim. 1242 gram nugget. Retirement allows me to dig in the dirt looking for gold nuggets. Please see the attached photo of Jeff and his amazing find. ❖



Jeff Yahn '76 with this gold nugget find.

Martha DeLong ('78) - I wrote a kid's book: *The CICADA and The HEDGEHOG* (Illustrated by my nephew and his wife - Zach Edick and Jamie Kovach). It is one of the outputs of a recent poetry writing diploma. I rode a bike from the top of the North Island (Cape Reinga) to the bottom of the South Island (Bluff) in March, 2022. 3,000 kilometers on tracks, washed out trails, forestry and mining skid roads, old rail trails, gravel roads with washboards that would jar your eye teeth loose and some 'regular' roads. Hardest thing I have ever done, I would suggest. However, NO REGRETS! On the big bike trip, I had a lot of time for reflection. So as Mike and Martha ride into the sunset of semi-retirement, we have decided to sell our house in Auckland and take the money and run to a nice little farm town called Cambridge (reminds me of the green rolling hills surrounding my hometown of Mt Vernon, Ohio). There, I shall be able to row and ride a bike forever! The new house will be filled with our stories and memories from our time in Nigeria, the UK, Bahrain and Oman. How lucky have I been? Off to race (rowing) in France in September with old UK rowing buddies and my kids. The girls had to flip a coin as to who gets to race with THE MOTHER! Will get to visit Venice, the new home to our eldest on my trip over yonder! Hope a few folks will get a good chuckle out of the 'Stereoscope' that now sits with the department as a reminder of my 'good ol' exploration days'! ...once was a very valuable tool for me as I lugged it around in my 4WD! Holler if anyone heads our way! +64 27 618 5533 martha.doublemm@xtra.co.nz. ❖

Curt Freeman ('78) - On July 8, 2022 **Jim Clough** (Class of '75) and **Curt Freeman** (Class of '78) met at lunch for the *Farthest North - Wooster Earth Sciences Dept Alumni Meeting*. A fun and lighthearted time was had by all as we reminisced about our great times at Wooster, our geology classes and professors, and our geology careers in Alaska. Following are a few recollections among the many we enjoyed discussing and are now sharing with our Wooster Geosciences alumni colleagues.

My first exposure to the “Wooster Experience” was a visit to campus in the summer of 1974, hosted by one of the COW basketball coaches, Mike Beitzel. I knew I wanted to major in Geology so we paid a visit to Scovel Hall. Since classes were out, it was a dusty, old building with but one staff member present: Dr. Frank Koucky. We met him in the Mineralogy lab where he was peering through a pet scope. When he got up to greet me, he put on a pair of glasses whose lenses were so scratched that I could barely see his eyes. I also noticed he was wearing one oxblood colored loafer and one black wing-tip! That did it for me, I knew right then and there that I was going to get a Geology degree from COW! As it turned out, Dr. Koucky was my IS Advisor four years later. He was brilliant, quirky, eccentric, unkempt and amazingly well read, what more could I ask for!

When I took Geo 101, from the amazing Fred Cropp, I already knew what I considered was all there was to know about rocks, having been a rock hound since I was a kid. The first quiz, on simple mineralogy, was easy and I aced it. The second, on stratigraphy as I recall, I got a soul-crushing C+! At the top of the quiz, in his unique scrawl, Dr. Cropp wrote "You can do better than this!" Embarrassment does not begin to cover what I felt. From that point on, Dr. Cropp took a personal interest in me, even to the point of reading and bleeding on my IS drafts. In the end his mentorship, and that of the other proffs, Dick Osgood and Jim Roche, helped me win the Charlie Moke prize for most improved student. I still have the Brunton compass that was the prize, worn and battered but still pointing sort of North!

One last thought: when we were invited to meet with Jim Clough for lunch that day, I was most impressed by the fact that Jim drank what I recall was 2 gallons of milk, perhaps more! He said dairy products were so expensive in Alaska that a student could not afford them (he was not kidding). He said he lived on peanut butter and only attended University of Alaska MS and PhD thesis defenses because afterwards, you got free pizza at a nearby pub called the Blue Marlin. Not sure why but the milk, peanut butter and pizza stories intrigued me and cemented my desire to attend University of Alaska, which I did from 1978-1980. Seems like only yesterday, not 4 decades ago!

In the fall of 2019, I announced my retirement after 39 years in the mineral exploration



Jim Clough '75 and Curt Freeman '78 enjoying tales of Wooster Geology classes and epic Alaskan geology adventures over lunch, July 2022

business, most of it running my own mineral exploration consulting firm. The effective date of my retirement was February 29, 2020 - little did I know how profoundly the COVID19 pandemic was going to affect the world! Looking back, I could not have dreamed up a more exciting, fulfilling and interesting career, the roots of which reach all the way back to Scovel Hall! Despite being officially retired, I am still active with a number of mining companies as a Director or Technical Advisory Board member and continue to consult on special projects from time to time. ❖

Robert Wheatcroft ('81) - After 30 plus years in research and teaching, first at the Woods Hole Oceanographic Institution and, since 1998, at Oregon State University, I have retired. In recent years, my research focused on land-ocean connectivity, in particular the transport and accumulation of fluvial sediment (and carbon) in estuaries and the coastal ocean. I keep busy backpacking, mainly in the Olympic mountains of Washington, woodworking, and traveling with my wife to lonely spots throughout North America in our Transit van. Professional details can be found at: <https://ceoas.oregonstate.edu/people/robert-wheatcroft> ❖

Mike Kozar ('83) - Recently Retired...as I look back on my 34 years with Exxon/ExxonMobil as a Sr. Geoscience Advisor (Exploration, Development, Production, and Research) I found it to be fun, challenging, and rewarding, affording me countless opportunities to travel the world and study geology at scales I could never have imagined. We will be staying in The Woodlands, TX for the time-being, since our immediate family still resides in TX. Looking to pursue interests that

have been put on hold including: Master-Gardening, community gardening, travel, volunteer work, biking, swimming and sometimes just Goofing-Around!!! Looking forward to future opportunities to get together with friends and family, and to reconnect with Wooster-Alumni. Excited about the Next-Big Adventures in Life!!! ❖

Leslie McCluskey ('03) - This year I transitioned from doing competitor analysis at Intel to a technical sales and new product development position at Ted Pella, Inc. I am excited to be learning new skills while working within my core interest in electron microscopy. My partner and I bought a home with a view of Mt. Shasta and I joined the Shasta Community Band. ❖

Stella Mascari ('07) - Stella lives in her van in the forests of the New River Gorge National Park in West Virginia. She works just enough to get by and enjoys the numerous recreation opportunities the rest of the time. She doesn't use her geology degree at all, but remembers enough to at least answer the question "what's this rock made of?" (It's all sandstone so: quartz). She somehow continues to manage to take 4 months off of work each winter to travel to the desert to avoid the cold and enjoy the numerous recreation opportunities out there. ❖

Andrew Collins ('12) - I recently started a position at the USGS. I work in the Landslide Hazards Program in Golden, CO. Turns out I work on some of the same projects as Kelli Baxstrom! We just finished a two-week field campaign installing equipment and collecting data



Andrew Collins and Kelli Baxstrom at Blackstone Bay

around western Prince William Sound, AK, studying the Barry Arm Landslide. At some point in the persistent driving rain, and after seeing the Team Alaska blog and facebook updates, we decided we should send a photo for the Wooster "Team Alaska (Alumni Edition)" collection. The whole Landslide Hazards Program is 30-some-odd people, and we thought it was neat that Wooster is well-represented. The photo is attached, and was taken by our USGS colleague Nikita Avdievitch in Blackstone Bay near Whittier. The rock is a slatey bit of flysch in the Chugach Terrane. ❖

Katharine Schleich ('12) - After 7 years with the Illinois State Geological Survey, I recently moved back to Ohio to be closer to family. I am enjoying my new position with the Ohio EPA in the Division of Drinking and Ground Waters. ❖

Lauren Vargo ('13) - I'm still in Wellington, New Zealand, working at the Antarctic Research Centre studying modern glacier change. I've just returned from a trip to Alaska instructing for Girls on Ice, a program of outdoor expeditions for teen girls to explore science, art, and mountaineering. I'm also looking forward to attending AGU this December, and seeing any other Wooster folks who are there. ❖

Clara Deck ('17) - This year, I'm super excited to have taken a Communications Specialist position with the Earth System Science and Modeling Division at NOAA's Climate Program Office. ❖

Juwan Shabazz ('19) - I'm working as a construction superintendent with Turner Construction's Philadelphia business unit. I'm currently working on \$160 million dollar core+shell building in the heart of Philadelphia's center city. The building will be a 14-story integrated community center that will house offices, lab and retail spaces. My team and I are slated to complete by fall of this year. ❖

Michael A. Thomas ('19) - I am currently the Geospatial/LiDAR Technician II with Woolpert. I handle LiDAR processing and creation of final products for clients such as Air Force Reserve Command (AFRC), United States Marine Corps, and Air Force Civil Engineering Center (AFCEC). I was acknowledged as an up-and-coming young geospatial professional at xyHt's (online geospatial magazine) January 2022 edition. I also earned my Master's of Science degree from the University of Kentucky's Digital Mapping and NewMapsPlus program, specializing in open source mapping and web page/interactive design. I am hoping to obtain my Certified LiDAR Technician license from the American Society of Photogrammetry and Remote Sensing (ASPRS) soon. ❖

Alexis Lanier ('20) - I am nearly finished with my MS in Geological Sciences from Michigan State University (fully defended, just waiting on edits for the thesis), and that I have begun a new job as a Geologist 2, more specifically a Hydrogeologist, with the Ohio Department of Natural Resources, Division of Geological Survey, Groundwater Resources team. On another note, I'm happy to answer any questions about my job or being a hydrogeologist for any Wooster Geo majors interested. Feel free to send them my way with questions! ❖

Emily Randall ('20) - In June, I started a new position as an Environmental Specialist for District 1 of the Ohio Department of Transportation (ODOT), which spans eight counties in northwest Ohio. My position involves assuring that we are abiding by Nation Environmental Policy Act (NEPA) regulations when constructing and maintaining our transportation projects. Our screening for projects involves researching ecology, floodplains, farmland, cultural resources, regulated materials, parks, air quality, drinking water resources, noise impacts, underserved populations, and public involvement. I use ArcGIS frequently to create visual depictions of this data. We use this information to determine how we can avoid, minimize, or mitigate our impacts on these resources. I've also recently become our district's MS4 (Municipal Separate Storm Sewer System) Coordinator, Pollinator Habitat Coordinator, and Scenic Byways Coordinator. So far, I've really enjoyed getting to explore so many of my different interests in my job, and I look forward to learning more as I spend more time with ODOT. ❖

Will Santella ('21) - After graduating in May of 2021, I completed my master's degree in education at Colorado State University in Fort Collins, Colorado. As part of my master's program, I student-taught science at a small rural high school. The experience was both energizing and harrowing, leaving me with many new axioms and opinions on the future of our education system. I have since left the field of formal education, and now work as a farming apprentice at The Hickories, a 100-acre organic farm in Ridgefield, Connecticut. I spend my days planting, maintaining, and harvesting a myriad of fruits, vegetables, and herbs, and I have been privilege to sheep-shearing, native plant and ecotype restoration, and participating in the mentorship of our five high-school interns; a task which imbues in me a sense of hope for our environmental future, and a confidence in the capability of young farmers to create that future. Moving forward, I am working with community partners to create a large-scale annual internship program at our farm for students to develop the critical agricultural skills needed to assuage the pressures of climate change and create a lasting sense of localized community

between food producers and consumers. I also have plans to start construction on a carbon-neutral tiny home within the next year, fulfilling my most ambitious lifelong aspiration. ❖

Special Thanks

Thank you to the many individuals, organizations, companies, and groups that gave their generous gifts to support the Department of Earth Sciences and our students. Below is a listing of our endowed accounts and their descriptions. For privacy reasons we are no longer listing the names of those who generously gave to the department.

If you would like to give a gift to the Earth Sciences Department, feel free to send your gift directly to the Department or to the College Development Office. It is very helpful to us if you designate how you would like your gift to be used, or if you would like it placed in a specific fund. Gifts that are not specifically designated will go in the general Earth Sciences Department annual budget to be used for the day-to-day operations of the department.

The James R. Baroffio Fund for Geologic Research helps defray expenses for analytical work (i.e., major element, trace element, isotopic, and geochronologic studies) for Seniors I.S. engaged in Independent Study.

F.W. Cropp III Endowed Fund for Independent Field Work in Geology helps defray expenses for field work done by Geology majors for their Senior Independent Study Theses.

The George H. Davis Endowed Research Fund helps support creativity and fieldwork carried out by geology majors engaged in Senior Independent Study (travel, field, lab, or other research related expenses) when the I.S. includes geologic mapping and/or field-based structural geology as core components.

The W. R. "Ted" Danner Fund for Student Geological Fieldwork helps defray field expenses for students and faculty engaged in geological fieldwork, whether in courses or in Independent Study.

Karl Ver Steeg/C.B. Moke Fund for Geologic Research helps defray field expenses for students and faculty engaged in Senior Independent Study.

Stanley M. Totten Geology Student Research Fund supports The College of Wooster Geology majors and their research related to their major.

The Sherman A. and Florence M. Wengerd Department of Geology Endowed Fund is used to purchase equipment and supplies for undergraduate teaching and research in the areas of sedimentology and stratigraphy. The fund also supports faculty travel in preparation for Senior Independent Study projects in any geological field.



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Other Name (if applicable): _____

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Home Address: _____

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Please complete if advanced degrees have been earned (not necessary if you have provided this information in the past).

Advanced Degree: _____ Year: _____

Institution: _____

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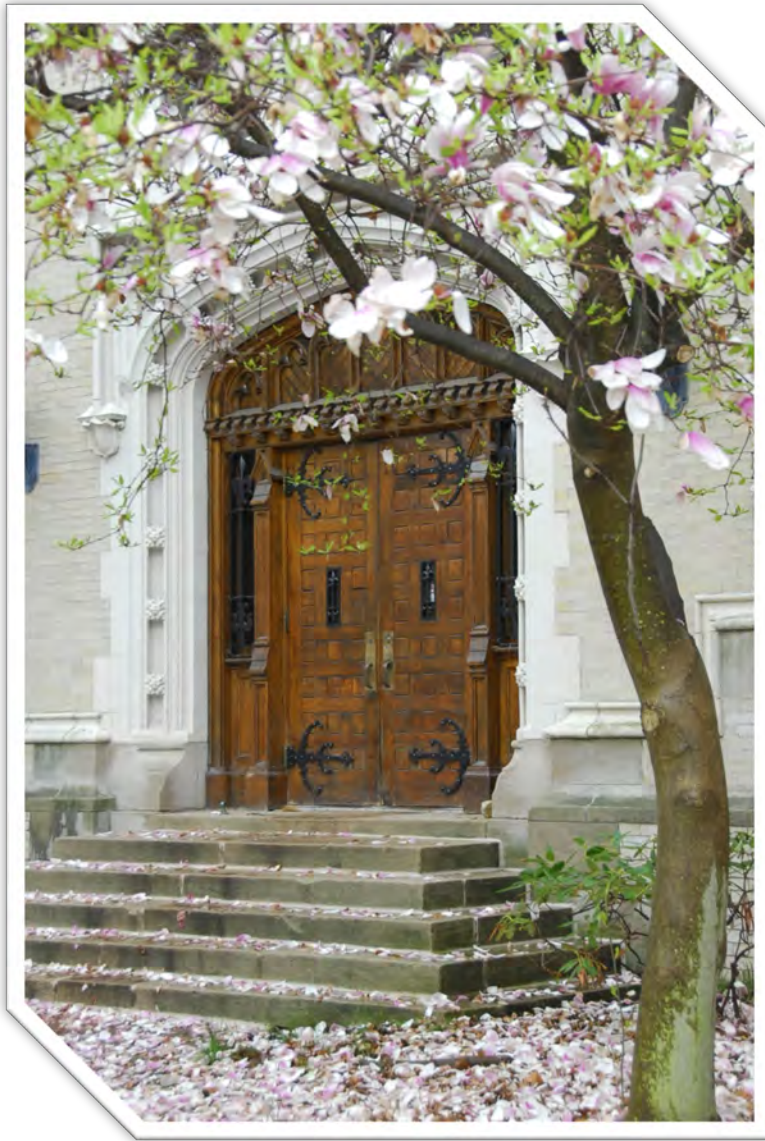


Photo by Andrew Collins ('12)

Scovel Hall, originally built in 1902 and renovated in 1983-1984, is the home of the Departments of Earth Sciences, Philosophy, and The Pre-Law Advising Program.

It bears the name of Dr. Sylvester F. Scovel, the third president of The College of Wooster.

<https://wooster.edu/area/earth-sciences/>

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