

FOUNDATIONS

NEWSLETTER OF THE GEO2YC DIVISION OF THE NATIONAL ASSOCIATION OF GEOSCIENCE TEACHERS
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Leveraging the Benefits of Field Courses for 2YC Students

By Harold Wershow

Everett Community College, Everett, WA

Gather a few geologists around a campfire, and field camp stories will circulate. We all know this to be a seminal moment in our geology education, when we struggled to apply years of book learning to the messy real world, and where lifelong friendships were forged under the blazing sun and occasional summer snowstorm. What we intuitively understood is validated by education research; students learn better and form community on field courses. But why wait until the end of an undergraduate education to expose our students to Geology's best class? Why not take advantage of the increased sense of community at the beginning of a student's journey, so that they have a built-in support network for the inevitable challenges?

And... why let the 4YC faculty have all the fun?

For all of these reasons, I created a geology field course at Everett Community College, but with a twist. No prerequisites. The course is open to any student, regardless of their scientific background. Of course I want to recruit majors, and I cannot imagine a better setting. We take the students to Washington's stunning mountains, from the glaciated ridges of the Olympic Mountains to the blasted volcanic terrain of Mount St Helen's. But most of the students won't be geology majors, and that is OK too. They are taking the class because it

meets their science distribution requirement, and therefore is probably the last science class they ever take. If we do our job well, this means they will re-enter the world with a deeper understanding of the nature of science and an openness to continuing to engage with science.



Students prepare to dig into periglacial sediment atop Lillian Ridge, Olympic Mountains, Washington.

We organized the class around landscape interpretation. My background is glacial geomorphology, and my co-instructor studies alpine botany, so we found a happy synergy in using the plants to understand the rocks, and vice-versa. Our learning objectives were two-fold; to make scientific observations about the plant communities and the geomorphic landforms, and then to attempt to interpret the controls on the plant communities and the history and future of the landforms. Above all, the emphasis was on using evidence (from observations) to support plausible interpretations.

This was not typical "show and tell" geology. Rather, we followed a three-step "learning cycle" approach. First, with minimal background but with structured tools for making repeatable observations, students explored a field site in groups of four. Second, we walked the students through the field site, sharing observations from all groups and filling in key observations that may have been missed. We

also shared plausible interpretations, emphasizing multiple hypotheses and brainstorming what additional information we would need to discard a given hypothesis. Third, we set the students loose in a new, but similar, field site and challenged them to come up with their own interpretations.

I'll let the students give the (anecdotal) results:



"Going into the class, I was afraid of essentially everything to do with the outdoors. Bugs, the weather, being out-of-shape, no showers, you name it ... Over the eight days we spent on our trip ... I learned to love hiking. To love exploring the world around me. How to look around myself and see more than just a pretty picture. Discovering how to decipher our surroundings (how they were shaped over time and how they might change in the future)."

"I've continued to ask myself questions regarding the geology in the environment I

observe around me in my yard, neighborhood, and on the trails I hike."

"I acquired more confidence by putting myself into a situation where I spent a week with strangers, whom eventually became friends."

For many students, this was a life-changing experience. They might now see schooling and working outdoors as real, attainable goals. As soon as the course ended, the students formed a hiking group and they have already teamed up to hike and explore our nearby trails. Just as I enjoy geologizing with my fellow geologists, these students now have a community of people who hike the mountains with joy and pick up rocks with curiosity. 🏔️

President's Column

by Callan Bentley

*Northern Virginia Community College,
Annandale, VA*

Greetings my fellow Geo2YCers. It's an honor to helm our organization for the coming year. I'm delighted to have the opportunity to help exert some influence on behalf of the Earth, and learning about the Earth, and your efforts to help people learn about the Earth. It's a terrific notion – this idea that we can help people know their home planet a little better. We're educating the next generation of geoscientists and geoliterate citizens. We're sparking a series of long-burning fires in the hearts of our students – fires that will sustain them as they leave our classrooms, transfer to four-year colleges and universities, and then perhaps on to graduate school before snagging well-paying, personally-rewarding careers. We are inspiring the next generation of mineral resource exploration geologists. We are imbuing the next generation of climate scientists with essential math skills. We are corroborating our English Department colleagues' lessons to our students in how to write, setting them up to be more articulate communicators of science. We are teaching human beings that they are Earthlings.



Physical Geology students on the Billy Goat Trail, Potomac, MD

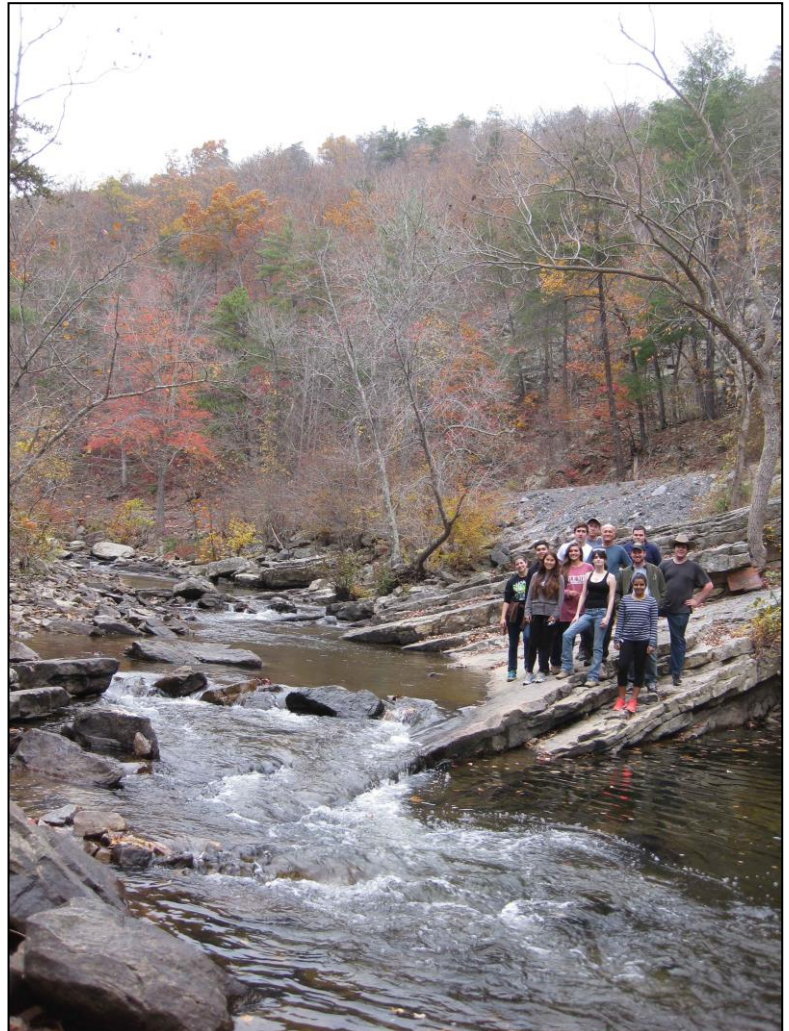
We take our students on their first field trip, teaching them how to prepare for a day spent outdoors, showing them new places that have been in their backyards all along – but had been previously occluded by a Smartphone screen. We are facilitating a new way of looking at the world: “that’s not just a rock; it’s the record of an ancient volcanic eruption, followed by an episode of continental collision.” It’s a story, it’s an insight. It’s evidence about the ancient history of our world: a violent, epic, primordial tale that leads to this moment. In every process, Earth generates a little clue or two. The cumulative record of these clues is a fantastic saga: from magma ocean to stromatolitic ‘slimeworld’ to Snowball Earth to Cambrian explosion and eventually the evolution of abstract thinking and human intelligence. We’ve come a long way, baby!

And we have the rocks to prove it.

The Earth isn’t the biggest planet in our solar system, but that’s fine. It’s big enough to have differentiated. This allowed the development of our metallic core, whose circulation powers a magnetic field. This field is powerful enough that it penetrates the rocks and the oceans and emanates out into space in the shape of a big puffy donut, protecting our atmosphere from what would otherwise be fatal erosion by the solar wind. Differentiation also provides for mantle convection, the power source driving plate tectonics. The eruption of volcanoes and gravitational acquisition of comets both yield water, and this water is critical for life. Every critter and microbe needs liquid water, and for 4.6 billion years, our planet’s surface

has had the right blend of solar heating and greenhouse gas insulation to keep the water flowing. What fortune! Every move we make, every breath we take, we rely on geology.

The insights of geoscience change the way we look at ourselves as individuals, and as humanity as a species; a phenomenon. From our Stone Age primogenitors, we have developed into a geological force on a planetary scale. *We move mountains.* We have fundamentally altered the planetary sediment transport budget with our cultivation and our dams. We have enabled a gargantuan transfer of carbon atoms from sedimentary rocks to the atmosphere and the oceans. The unprecedented rate of this flux has potentially forestalled a new Ice Age, and set us up for climatic destabilization. We have altered ecosystems in dozens of ways (fragmentation, pollution, introduction of non-native species) that have homogenized and pauperized biodiversity in many of the planet’s biomes.



Historical Geology students on Passage Creek, George Washington National Forest, VA

Society seems to be gambling that this is all going to be just fine. We have figured out that refuges and protected areas are a useful hedge against this bet, and the parks that have resulted do a million wonders: they restock fisheries with vital players (some of whom are quite tasty), they teach our ecologists lessons about the complex interactions among complicated systems, they serve frequently as awesome places to take students to learn about natural processes, including geology. They are places of refuge for the human spirit as well, places of rejuvenation and inspiration, places that offer a taste of a world before the digital, before the industrial. The American public appreciates their parks. 99.2% of the 2.8 million public comments submitted to the Department of the Interior to inform its consideration of downsizing Bears Ears National Monument favored the preservation of the park at its current size. And the potential loss of scientific insight is also motivating people. As soon as the downsizing of the parks was announced, The Society of Vertebrate Paleontology countered with a [lawsuit against the Trump Administration](#) for imperiling major vertebrate fossil localities currently protected within Grand Staircase-Escalante National Monument. It's an interesting time to be teaching about the scientific study of the Earth, I'm sure you'd agree.

I feel more motivated than ever to impart a sense of geoscience literacy to my students, because I know that they will be making decisions (including at the ballot box) that will determine the course of our civilization's future. They need the perspective of Deep Time to do this rationally. They need a sense of the boundaries of a finite planet. They need skills in order to do their jobs as citizens.

In our labs, we train them. They relearn how useful algebra can be. They practice calculating rates. Students acquire skills like the ability to make sense of a topographic map – to stare at that collection of wiggly lines and have a landscape pop out. It's almost a sort of super power, the ability to use this tool. They can then evaluate that landscape for the geomorphic patterns we've trained them to recognize, to interpret. They then have the ability to make decisions about the past of these landscapes: were they glaciated? Rejuvenated? Subject to longshore drift? They can make deductions about the crust beneath: is it a domelike sequence of strata? Is it jointed? Would it be a good target for

oil exploration? How about precious metals? Would it be a good place to build a school? Similar insights come from other tools: petrographic microscopes, Google Earth, GPS. We can show Kansas bouncing up and down after an earthquake in Iran. We can show evolution in a sequence of scallop fossils. We can show how our planet's temperature has changed by plotting isotopes of hydrogen and oxygen, comprising the ice crystals that made up a snowflake that nucleated and fell from a cloud onto the Greenland ice sheet 100,000 years ago. These things are *astounding*. Better yet, they are verifiable, testable, and have passed test after test. They are reliable. The insights our science grants the world are mind-bogglingly cool, essential and useful, and make us conscious of the special situation we find ourselves in, living at the dawn of the Anthropocene here on the third rock from the Sun.



Regional Field Geology students in Glacier National Park, MT

You and I are the ones who get the honor of opening the world's eyes to geoscience. We reintroduce our students to their planet, what it's made of, how it works, how it sustains them, and how it can kill them. We provide a vital service, and we get to work a job that is extraordinarily gratifying fun. For each new student, we slip a pair of geology-colored glasses onto their face, and lean back with satisfaction as they stare about in newfound wonder. Their appreciation is our greatest reward.

I look forward to an exciting year in teaching geoscience with you. 🏔️

2017 Outstanding Adjunct Faculty Award Voting is OPEN!

by **Karen Layou**

Reynolds Community College, Richmond, VA

It's that time of year again—we need your help in selecting the NAGT Geo2YC Division 2017 Outstanding Adjunct of the Year supported by Pearson Publishing. This year's nominees include Martha Murphy of Santa Rosa Junior College, Sherri Oaks of Front Range Community College, and Wendi J. Williams of NorthWest Arkansas Community College.

Please take a few moments to visit https://nagt.org/nagt/divisions/2yc/oafa_voting.html to view the nominee's ideas of how they would put the Pearson stipend worth up to \$750 to use toward their professional development and classroom needs. Please note you must be signed into your NAGT account to vote (so this might also be a good time to renew your membership if needed!). You can read more about each of these wonderful geoscience community leaders in prior 2017 issues of the [Foundations newsletter](#). Voting will be open through January 31, 2018 and the winner will be announced in the first 2018 issue of Foundations.

As we look toward the new year, the Outstanding Adjunct Faculty Award Committee is looking for new participation—both on the committee and through nominations of your fantastic adjunct peers. If you would be interested in serving on the award committee, please contact Karen Layou at klayou@reynolds.edu for more information. If you have a colleague who inspires you to try new teaching strategies, who shares innovative classroom assignments, who makes a difference in your department, or who simply does an amazing job of encouraging their students and community to engage with geoscience, please nominate them for re-cognition at:

http://nagt.org/nagt/divisions/2yc/oafa_nomination.html. 

Snapshots From Geo2YC Annual Meeting at GSA '17


by **Kaatje Kraft**

Whatcom Community College, Bellingham, WA



Thanks everyone for a great turnout at the annual meeting.



Geo2YC past-presidents Dave and Merry enjoy watching others take the lead. 


Readers' Geo2YC Pencil Photographs

As always, we would love to share your awesome geology photos here in the newsletter – with one provision! Each photograph must include the quite indispensable Geo2YC pencil.

Below is a fantastic shot of river cobbles overlying sand near the Skagit River, northwestern Washington submitted by Harold Wershow of Everett Community College.



If you have taken your Geo2YC pencil anywhere this past year, or even have a cool rock formation where you live or work that you can grab a photo of using the pencil as scale, please consider submitting it to the newsletter for publication. All we need is an approximate location. You are welcome to give coordinates if appropriate to do so.

If you do not yet have a pencil, look out for an NAGT booth at next year's Earth Educators' Rendezvous. 



Letter from the Editor

Dear Colleagues,

Thank-you for another great year of events, thought-provoking articles, and exciting announcements! Of course, as this year ends and another begins, we continue to be on the lookout for *new material*. If you are looking to let people know about work you are doing may we encourage you to keep Geo2YC and the newsletter in your thoughts.

With the New Year comes a *new volume* of the newsletter (vol. 7 in 2018) and on this occasion also a *new editor* for the newsletter. Suki is looking forward to serving the Geo2YC in this position.

As you may know, each volume carries a *unique banner image* overprinted with the newsletter name. For 2018 we would like to crowd-source, and obtain permission to use an image you have taken. If you have one that you'd like to share, please send a high-resolution image to the email listed below.

At this time of year it is also common for many subscriptions to expire. If that is the case for your membership to NAGT and this division I sincerely hope you will consider *renewing* for 2018.

If you have questions or comments about the *content* of FOUNDATIONS, or have suggestions for future newsletter items please contact Suki.

Thank you!

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