EDITORIAL

MAKING TIME TO CULTIVATE OUR INTERDISCIPLINARY CURIOSITY

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Interdisciplinary research is often extolled and celebrated, including within the Earth and environmental sciences, but not always practiced in our educational programs. Last summer, I was able to participate, albeit in a small way, in an interdisciplinary approach to my department’s capstone environmental field course. It is one of several courses taught each summer at the University of Michigan’s field station in Wyoming.

Owing to a last-minute change in personnel, I found myself part of the faculty line-up. I was not an obvious substitute as my research interests place me squarely in the “hard-rock, solid-Earth” side of my department, and not the “hydrological, surficial processes, environmental science” side. It was a delightful experience as it gave me the opportunity to learn new things (e.g., hydrology and chemistry of stream waters, slope stability and landslide hazards, etc.) and add some new course content, in large part inspired by this issue of Elements, “Large Igneous Provinces: Versatile Drivers of Global Change.”

This issue provides a highly interdisciplinary exploration of how the injection of voluminous basaltic dikes and sills into sedimentary rocks has led to some of Earth’s most devastating environmental crises. The most well-documented case is the LIP (large igneous province) event that affected a thick sedimentary basin in Siberia, filled with coal-bearing seams and sulfate-bearing evaporites. As explained by Svenson et al. (2023) this trigger, the Permian-Triassic mass extinction was less the release of volcanic gases and far more the toxic outgassing of “burned” (i.e., contact metamorphosed) sedimentary rocks. Alarmingly, these LIP–sedimentary rock interactions are the closest analogy we have within the rock record of what our industrialized, global society has been doing over the past 100+ years, namely, the burning of carbon and sulfur-bearing compounds, originally hosted within sedimentary rocks.

Inspired by this issue of Elements, and the location of our Wyoming field station, we took our environmental majors to some well-exposed outcrops of Cretaceous sandy siltstones filled with coal seams, as well as some Triassic gypsum-bearing evaporites. We then drove out to the Craters of the Moon volcanic field in Idaho for an overnight trip. Here, our Michigan students could scramble over young (Holocene) basaltic lavas, a far cry from the thick glacial till that covers most of Michigan (Lower Peninsula), where even outcrops of lithified, sedimentary rocks are scarce. However, I reminded our students that their home state was once the location of a LIP event ~1 billion years ago, giving rise to the Keweenaw flood basalts and associated intrusions (and economic ore deposits) exposed in the Upper Peninsula.

Back at our Wyoming field station, we assigned the students an exercise to quantitatively compare global use of fossil fuels over the past 30 years (i.e., mass of carbon and sulfur released into the atmosphere) versus the injection of several 1000s of km3 of basalt into various sedimentary rock layers. One of the students, somewhat in jest, asked me why they had to “worry about these metamorphic/magmatic processes since they were environmental science majors?” To which I laughed and replied, “The days when we can all be isolated in our respective sub-fields are long over, which is good news!”

We have all witnessed the highly productive bounty that emerges from interdisciplinary research, whether it be the exploration of exoplanets, the introduction of geomicrobiology into the mainstream of Earth science departments, or growing collaborations between geophysicists and geochemists now reflected in increasing calls from funding agencies for interdisciplinary proposals (e.g., the National Science Foundation initiative SZAD: Subduction Zones in Four Dimensions). Indeed, more than one key plate tectonic discovery in the 1960s was triggered when a graduate student attended their department’s weekly seminar on a topic that was far afield from their thesis research (see, for example, Plate Tectonics: An Insider’s History of the Modern Theory of the Earth by Naomi Oreskes).

The irony is that in an era when interdisciplinary research is increasingly encouraged for its rich potential, there has been a noticeable drop-off in attendance at department-wide weekly seminars. This is the opportunity to listen to a speaker, invited from another institution, to talk about their research to a broad audience. Often, the lecture topic does not directly overlap one’s own research area and is, thus, an opportunity to cultivate interdisciplinary curiosity. In my unit, seniors are followed by a reception, where food and drinks are provided, along with a chance to ask more questions. A genuine departmental “community-building” activity, if ever there was one!

When I first joined my department over 30 years ago, nearly all the graduate students, postdocs, and faculty consistently attended the weekly seminar, irrespective of lecture topic. It was hard to get a seat if you were late! So why the slow erosion of turnout over the decades? Why the shift to only attending when the lecture topic overlaps one’s research area?

I suspect the answer lies in the same set of societal factors, driven by technological changes, that has shifted the consumption of news and entertainment to smartphones and laptops, and less often to sitting with others in a theater or auditorium. Covid is still circulating, yes; and time is precious, yes. But so is exposure to discoveries and methodologies far from one’s own area of expertise! I am determined to learn what changes will improve attendance. In the meantime, I will continue to encourage our students to develop the habit of expanding one’s horizons in the most delightful of ways—consistent attendance at the weekly department-wide speaker series. Who knows what creative, breakthrough ideas may be seeded?

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