

GeoConnections 2

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Introduction

GeoConnections 2 (GC2) is a field-based program that focused on introducing geochronology concepts to diverse undergraduate students. This program developed from research that focused on in-classroom teaching that showed enhanced cultural relevancy of geoscience curricula could potentially motivate students to learn geoscience content knowledge from a use-based perspective. This project extended those findings to the field environment (i.e., using Indigenous research frameworks to design a field-based geoscience activity vs. an in-class activity). In addition to the field experience, multiple subject matter experts (i.e., geoscience professionals and graduate students) participated in the field trips and helped to represent a diverse geoscience community for the project participants.

Indigenous research frameworks are founded on the underlying values of Indigenous communities. Some Indigenous scholars have framed this as the 4Rs/6rs/7Rs, but they all reference various values that many Indigenous communities prioritize highly, albeit non-hierarchically: Respect, Relevance, Responsibility, Reciprocity, Rights, Reconciliation, Relationships, Representation. Requisite to implementing these values within contexts that serve multiple Indigenous communities (e.g., the geoscience community) is multilogicality, a dynamic perspective which recognizes shared values through transparent and explicit discussions (i.e., dialogic conversation) between members in a shared space.

Inclusive Design Factors in GC2

1. Trust-Building and Co-Production

Undergraduate STEM students were recruited into the GC2 program through posting of flyers, which included designs from an Indigenous artist, and word-of-mouth communication through Indigenous STEM scholar networks, which were accessed via connections between Dr. Reano and the Labriola American Indian Data Center Library (Labriola) at Arizona State University (ASU). Another form of trust-building undertaken directly with the students that were recruited into the program, were weekly individual meetings to provide informal academic mentoring towards geoscience career paths, introduction to geochronology concepts and jargon, and to provide input on the planned fieldwork campaigns. Undergraduate students provided input on their academic motivations for joining the GC2 program and also began to share more personal preferences related to travel and lodging during fieldwork. Using this information, Dr. Reano was able to provide detailed itineraries that were co-produced by the undergraduate students to include food and “general interest” stops at unique locations that were known to students as well as car and sleeping arrangements that aligned with the students’ community cultural values. Student contributions to the itinerary were constantly acknowledged both during the field excursions as well as afterwards.

2. Family + Ethics of Care

One of the underlying values of IRFs is respect and love for our fellow Human as well as our non-Human relatives (i.e., animals are not beneath us). Zia Reano joined us on the fieldwork excursions and Dr. Reano considered her as much as any other participant on the trip as we had

to accommodate her various needs (e.g., eating schedule, daily stamina differences, ensuring continual rehydration). This helped to create a sense of community amongst our group as self-care and care for others was demonstrated as a value of the GC2 program. Food allergies and other dietary restrictions are prevalent in many fieldwork contexts and often require individualized attention. The previously mentioned trust-building activities enabled participants to share these concerns and co-develop their individualized solution with Dr. Reano. On the field excursions themselves, Zia slowed the pace of the field excursions and seemed to reassure students that a slower pace was normal and, because I was with Zia, they also didn't feel excluded from accessing the geoscience content knowledge being shared with students who naturally had a quicker pace.

Field Excursions during GC2

1. Las Cruces, NM: Fluvial geomorphology and basin analysis using geochronology



Photo Panel Descriptions: A) Posted signs indicating that permits were required to enter our first field stop. B) A dinosaur museum in the desert that we came across only because we diverted our first field stop, for which we had not acquired permits prior to the trip. C) Dr. Lorrie Carnes leads a discussion on using various geochronometers to unravel syndepositional interconnectedness of basins in southern Arizona. D) GC2 participants discuss differences in grain sizes of sediment across the Rio Grande river channel. E) Mike Chojnacki leads a discussion on using drone technology to make geologic observations of a landscape.

2. Socorro, NM: Indigenous STEM and Pennsylvanian stratigraphy/local deformation events during the Laramide Orogeny in NM



Photo Panel Descriptions: A) A GC2 participant interacts with the Vice-President of the Navajo Nation during the American Indian Science and Engineering Society-Region 3 conference. B) We ate several meals together and celebrated a birthday during this trip. C) Kevin Hobbs leads a discussion about Pennsylvanian stratigraphy and the Laramide Orogeny in New Mexico. D) GC2 participants and subject matter experts discuss the evidence for deformation of the local stratigraphy. E) A group photo of the GC2 participants.

3. *Flagstaff, AZ: volcanology and data collection for geochronology analysis*



Photo Panel Descriptions: A) GC2 participants listen to Jacqueline Giblin describe how geochronology is used to unravel the regional volcanic history of Arizona. B) GC2 participants observe volcanic features exposed along a semi-accessible trail in Sunset Crater Volcano National Monument. C) GC2 participants prepare to collect a sample for geochronologic analysis. D) Dr. Reano poses with Zia Reano at the second field stop. E) The flank of Red Mountain, our third field site, showed several features that are characteristic of volcanic cinder cones. F) A GC2 participant takes a break while exploring the exposed outcrops.

Participant Evaluations of GC2

What would you tell future participants to expect from this program?

“Be open to speak to the consultants and the graduate students...because that's ultimately what they're there for. They're there for help and they're there to give you insight on what to expect in geology. So I feel like if you can talk to them more, you can build a deeper connection with these people...I feel like those connections are gonna help you out in the future, because you never know--you might need a reference.”

“I think in life it's valuable to be vulnerable and just as much as you're learning from other people, people are learning from you...You're not just there to do Science. Science is part of it, but you're also there to make connections, and to like, learn about other people and what their

struggles are, and they're there to learn about you. And so it can be very scary and intimidating, but it's worth it. It's worth doing that, and just being honest like that...I think that it was so rewarding to just get to know people like that...and to interact with these people, even if it was just for a short amount of time. you know, and I feel really lucky with that”.

“I would tell them that the networking that we do as groups together is going to be very meaningful and long-lasting. I would also tell them that different groups have different dynamics. ...it's perfectly fine to be who you are in a new environment. Don't be afraid to open up to new ideas, perspectives, as well as people. We all have a thing to say, and it may take some time for us to really open up. But you know these connections are going to be very beneficial for them as students, but as people as well.”

“I guess expect that you'll learn more than just like geoscience stuff. You'll also learn about the people who are in geoscience like you'll get the chance to hear other people's stories and their experience in it...people come from many different backgrounds that might have different approaches to science, but they're all valid. So I guess, be open-minded and ready to learn about the people you're around at GeoConnections.”