AGeS Laboratory Plan

Oberlin College Short-Lived Fallout Radionuclide Lab

Updated December 2021

Laboratory Overview

We are a small short-lived fallout radionuclide (gamma counting) lab housed at Oberlin College. We are new to hosting visitors but are excited to be part of AGeS and to have people come and use our lab facilities. The lab has three gamma counters, two of which can measure a broad or extended range of energies, including $^{210}Pb_{ex}$, and one of which can only measure energies above ~100 keV. Most Earth science applications of short-lived fallout radionuclides include measurement of ^{7}Be, ^{137}Cs, and $^{210}Pb_{ex}$.

Gamma counting is relatively more straightforward process than other geochronology techniques. We have equipment for sample preparation – primarily sieving and drying samples – as well as space to pack samples. In addition to the detectors, we have specialized software, which can be accessed remotely, to analyze data from the detectors. The one major piece of equipment we don't have, and which is necessary for most analyses, is the ability to measure the elemental composition of samples (XRF).

Timeframe

The main barrier to gamma counting is that most samples require a full day of counting, meaning that we can run up to 6 samples a week on each detector, or 18 samples a week on all three detectors. It takes three weeks from the time of packing a sample until it can be counted. Thus, we envision that someone visiting the lab would spend a few days to learn the equipment and software, and to prepare their samples, then would leave behind their samples for counting. Alternatively, someone could work with us on the sample preparation piece and arrive with packed samples that have been equilibrating for three weeks. Then you could stay and learn to run the detectors for a few days and we could keep counting your samples after you leave. While at Oberlin, we will teach visitors how to do all the post-counting analyses so that they are able to do that after leaving.

We do not have a huge demand on the lab for visitors but do have some time sensitive projects that mean we need a little lead time to fit visitors in. It would be helpful to have a month of advance warning.

Costs

The main costs for us are liquid nitrogen, detector time, and containers for samples to get packed in. All of this runs at about $50/sample unless it is very small and needs to be counted for 4 days, when it will cost $150/sample. We can help to arrange for housing in Oberlin for guests.

Preparation for Visitors

We work with unconsolidated sediment samples. These are typically collected from a river (for fingerprinting purposes) or from a sediment core or depth profile (for dating deposition). We recommend that river samples be sieved to a consistent grain size, although that can be done here at Oberlin. Sediment core samples are typically analyzed in bulk. If you are able to pack samples into containers before arriving, then you can count some of your actual samples while you are

here. If you pack samples here, you will have to either come back to count samples or learn how to use the detectors with other samples.

Laboratory Staff

Visitors will coordinate with Amanda Schmidt, Associate Professor of Geology at Oberlin College, to arrange visits. While at Oberlin, Amanda and her undergraduate students will help you to complete your lab work.

Data Reduction and Interpretation

We will work with visitors to ensure that they are able to complete all steps of data analysis and reduction even after leaving the lab. We have remote access to lab computers to facilitate that work.

Contact Information

Please contact Amanda Schmidt (aschmidt@oberlin.edu) with any questions.

Diversity, Equity, and Inclusion

The mission, vision, and goals of the Oberlin College Geology Department are fully embraced by the Short-lived Fallout Radionuclide Lab at Oberlin College. These are:

MISSION

We aim to empower and equip students with scientific approaches to studying Earth. We do this by cultivating curiosity about Earth systems and how they function and interconnect through deep time. We prepare students to be ethical scientists able to address how people act as geologic agents, sometimes in problematic ways, and communicate these concerns and solutions to others.

VISION

We aspire to foster passion for Earth science and inspire lifelong curiosity about the world around us through experiences and opportunities for mentored research in the classroom, laboratory, and field. We hope to do this in a welcoming, inclusive environment that understands the potential for all students to find their interests in, and connections to, Earth systems.

GOALS

We hope our students build a deep understanding of Earth, while developing technical and communication skills that they can apply in a variety of careers including education, government, nonprofits, and industry. Regardless of their path after Oberlin, we hope our graduates will prioritize stewardship for our planet, will approach investigations and choices in ethical ways, and will make positive contributions to issues of social justice and sustainability.

Thus, we are excited to welcome students and scientists from a wide range of institutions and backgrounds to visit our lab. We home that while here at Oberlin we can help you with your research and you can share your experiences and work with us.