



## UAF Geochronology Laboratory – AGeS Lab Profile

The Geochronology Laboratory at the Geophysical Institute of the University of Alaska Fairbanks is a state-of-the-art  $^{40}\text{Ar}/^{39}\text{Ar}$  dating facility located on the Troth Yeddha' (Fairbanks) campus. We use  $^{40}\text{Ar}/^{39}\text{Ar}$  dating (often in conjunction with other geochronologic and thermochronologic systems) to study mountain building, fault displacement, volcanic eruptions, and the timing of sedimentary deposition. A new Isotopx NGX-600 multi-collector mass spectrometer has been taken into operation in June 2023. This system features a  $\text{CO}_2$  laser and a low-blank resistance furnace for argon extraction. We can perform laser step-heating, single-grain total fusion, and high-resolution furnace diffusion analyses, and are happy to customize analyses to your needs. Data acquisition and reduction are done using Pychron. The Geochron Lab is equipped to perform rock sample processing and mineral separation, including crushing, sieving, density separation, magnetic separation, and acid leaching of samples. The facility also includes microscopes for picking and documentation, a computer to analyze microCT data, and an FTIR spectrometer for sample characterization. Facilities for further characterization of samples, including SEM and microprobe analyses, are available in the department.



### Student Time Frame

Students are encouraged to contact us several months ahead of time to discuss their sample analysis needs as well as the processing and analysis time frame. Since  $^{40}\text{Ar}/^{39}\text{Ar}$  dating involves neutron irradiation, individual stages of processing, picking, and argon analysis need to be synchronized with the irradiation schedule. Two visits to UAF are necessary, one for mineral separation, and one for mass spectrometry after neutron irradiation. We will provide training and guidance in all aspects of  $^{40}\text{Ar}/^{39}\text{Ar}$  dating, and assist with data reduction, interpretation, and



presentation. Some rock sample processing and sample characterization can be done by students at their home institutions or by UAF staff to save on travel time, but it is preferable for students to directly perform work on all stages of the process to gain experience. The total time spent at UAF depends on the number of samples as well as the types of analyses, but we generally recommend two stays of at least one week each to provide a margin for contingencies. Turnaround times for neutron irradiation are typically 1-3 months, which determines the minimum amount of time between the two visits. Student projects are prioritized when scheduling analyses to accommodate project milestones and graduation timelines.

### **Travel Considerations**

Fairbanks, situated at the heart of Alaska, experiences a range of unique travel challenges across the seasons. During the summer months (mainly May-September), the city encounters a surge in tourism, resulting in limited hotel and rental car availability and a peak in accommodation prices. These months are also exceptionally busy for our staff, as the short window coincides with the prime time for Alaska-based fieldwork. Winters can be very cold (temperatures of  $-40^{\circ}$  F/C are not uncommon), and specialized winter gear is highly recommended during these times. Fairbanks only receives a few hours of sunlight each day in the winter months, but travelers are frequently rewarded with stunning aurora views. Regardless of the time of year, Interior Alaska boasts stunning natural beauty and provides opportunities for fun activities outside the lab such as hiking, kayaking, fishing, and foraging in the summer and aurora watching, cross-country skiing, and dog mushing in the winter.

### **Analysis Costs**

Please contact us for current pricing and availability. We will work with students to optimize the number and type of analyses to fit the problem and the student's timeline. We may provide a limited number of free  $^{40}\text{Ar}/^{39}\text{Ar}$  analyses to support student development as well as diversity and inclusion initiatives (such as AGeS).

### **Laboratory Staff**

Florian Hofmann (he/him) is a Research Assistant Professor at the Geophysical Institute who manages the Geochron Lab and is responsible for training new users. Sean Regan (he/him) is an Assistant Professor at the College of Natural Sciences and Mathematics and the Geophysical Institute who supports the operation of the lab. Other members of the staff and students might also be involved in mentoring visiting students.

### **Contact**

Please contact Florian Hofmann ([fhofmann@alaska.edu](mailto:fhofmann@alaska.edu)) for questions or to discuss potential collaboration for  $^{40}\text{Ar}/^{39}\text{Ar}$  analysis. Additional information can be found on the Geochron Lab website: <https://www.gi.alaska.edu/facilities/geochron-lab>