

## **F26.47 Sedimentary records of climate and environmental change**

### **Overview**

In the Sedimentary Records of Environmental Change Lab, we study how Earth's climate and environments have changed over the recent geological past. Our work focuses on lake sediments and permafrost soils—natural archives that preserve information about past conditions. Students in the lab can choose from several analytical methods to study these materials, including techniques that measure physical characteristics, biological remains, and chemical signals. Much of our work centers on lake cores collected in Alaska and other northern regions, where sediments have recorded how landscapes and ecosystems responded to shifts in climate. The sediments contain evidence for volcanic eruptions and earthquakes, which contributes to hazard assessments. The data we generate help build a broader picture of how climate has varied over time. By comparing these records with Earth system models, we can test ideas about what drives climate change and how sensitive the climate system is to different factors, such as greenhouse gases. While our focus is on the past, this work contributes to a deeper understanding of the processes that influence today's climate.

### **What the student will DO and LEARN**

The student will learn and perform laboratory procedures involving one or more of the following methods as applied to sediment or soil cores: particle-size distribution; biogenic silica abundance; carbon and nitrogen abundance; particle shape; visible reflectance spectroscopy; amino acid composition; radiocarbon dating. The student will integrate their dataset with others from the same sediment core, which have been generated by graduate students. They will use a spreadsheet or existing code to analyze and visualize the data. They will prepare a written report describing the methods and results, and interpreting alternative explanations for the changes measured through time. The number of hours per week that the student dedicates to this project can be flexible, depending on the specific dataset and resolution of the sampling.

### **Additional benefits**

The dataset(s) and scientific report generated by the student will be integrated into a larger manuscript led by a graduate student and guided by the faculty advisor. The goal is to publish a peer-reviewed journal article, with the undergraduate student as coauthor, featuring multiple datasets that together provide a multi-faceted reconstruction of past environmental and climate changes at the study site. Students will also have the opportunity to engage with the broader research program of the Past and Present Climate Change Group in the School of Earth and Sustainability. This includes weekly lab group meetings with graduate students, postdoc's and research faculty.

### **Additional qualifications**

Course work in Environmental Science or Geology or both, with a GPA of a B or higher.

### **Time commitment**

6 hrs/week for 30 weeks