Stanford

Jacob Long

Ph.D. Student in Earth and Planetary Sciences, admitted Autumn 2023

Curriculum Vitae available Online

Bio

BIO

I grew up just outside of Houston, Texas, in the shadow of the world's energy capital. Later in life, I spent years living abroad in Mexico City, one of the largest urban centers in the world, and in the Canadian Rockies, exploring some of the most pristine ecosystems on the planet. That upbringing has given me a unique perspective on a statement from a U.N. report: "Climate Change is the defining issue of our time, and we are at a defining moment." Over the years, I've seen the causes of climate change and I've seen the consequences – both have made me profoundly determined to use my education, time, and talents finding solutions to our climate crisis.

At Stanford University, I am building on these experiences and my educational foundation in geoscience by pursing a Ph.D. in Earth and Planetary Sciences focused on carbon capture utilization and storage (CCUS). CCUS has the potential to dramatically abate CO2 emissions across the globe, especially if the scientific community, along with industry and government partners, are able to enhance and scale up needed technologies in the coming years.

My research specifically focuses on the long-term storage of CO2 in subsurface reservoirs through conversion into stable carbonate minerals. If a reservoir with an ideal chemical composition is used, such as basalt (which is rich in divalent metals such as calcium, magnesium, and iron), the CO2 will react with the reservoir brine and lithology to produce carbonate minerals. I am investigating enhancing this process so that large amounts of CO2 can be stored relatively quickly with a high degree of security. My laboratory-based experiments leverage a combination of aqueous geochemistry and rock physics to understand how processes such as basalt dissolution, mass transport, and carbonate precipitation are affected by reservoir mineralogy, fluid evolution, porosity, and permeability.

HONORS AND AWARDS

- Excellence in Research, Brigham Young University-Idaho Department of Geology (April 2022)
- Academic Excellence, Brigham Young University-Idaho Department of Geology (April 2023)
- Outstanding Field Camp Student, Brigham Young University-Idaho Department of Geology (April 2023)
- Outstanding Department Service, Brigham Young University-Idaho Department of Geology (April 2022)

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Member, Geological Society of America (2022 - present)
- Member, American Association of Petroleum Geologists (2019 - 2023)

EDUCATION AND CERTIFICATIONS

- BS, Brigham Young University-Idaho , Geology (2023)
- Certificate, Brigham Young University-Idaho , Geospatial Technology (GIS) (2023)

SERVICE, VOLUNTEER, AND COMMUNITY WORK

- Earth Science Field Trip Guide (September 2022 - April 2023)

LINKS

- Rock Physics and Geomaterials Laboratory Website: https://rgl.stanford.edu/
- LinkedIn Profile: www.linkedin.com/in/jacob-long-geology

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

I am interested in how the carbonation process (during carbon capture and storage projects) affects the porosity, permeability, and other properties of the targeted reservoir. Furthermore, I am interested in the composition of the reservoir lithology and the impact that varying composition (i.e. the amount of clay in a sandstone) has on the carbonation process. This research is conducted by performing experimental rock physics tests and monitoring techniques. Ultimately, I am interested in how the outcomes of these projects may integrate with sedimentology, sequence stratigraphy, and basin analysis to impact reservoir characterization and suitability.

LAB AFFILIATIONS

- Tiziana Vanorio, Rocks and Geomaterials Laboratory (10/25/2023)

Professional

WORK EXPERIENCE

- Research Assistant - Stanford University Department of Earth and Planetary Sciences (October 1, 2023 - present)
- Assistant Director of the Field Camp - Brigham Young University-Idaho Geology Department (May 1, 2023 - July 31, 2023)
- Teaching Assistant - Brigham Young University-Idaho Geology Department (September 1, 2020 - July 31, 2023)
- GIS Intern - Idaho Falls Power (April 1, 2021 - August 31, 2021)