NICOLE FERRIE

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Education

The University of Texas at Austin | Austin, TX 2022-present
PhD Student, Department of Earth and Planetary Sciences
Research focus: Utilizing boron geochemical behavior to (1) improve paleo atmospheric CO_2 reconstruction using paleosols and (2) source fluid pathways in shallow subduction zones.
Areas of Study: Earthquake generation, paleoclimate proxies, boron geochemical applications, isotopic fractionation, surface chemistry, chemical tracers, geochemical transport, geomechanical modeling.
Co-advisors: Daniel O. Breecker & Demian M. Saffer
Cumulative GPA: 4.0/4.0
Expected Graduation: 2027

University Of Washington | Seattle, WA 2017-2022
Double Major
Bachelor of Science in Earth and Space Sciences, Geoscience Option with Honors, (major GPA: 3.89/ 4.0)
Bachelor of Science in Atmospheric Sciences: Climate Option, (major GPA: 3.62/ 4.0)
Honors Thesis: "Constraining Deformation Processes in the Brittle-Ductile Transition Region Above a Subduction Seismogenic Zone"
Co-Authors: Cailey B. Condit, Melodie E. French, Jason N. Ott
Undergraduate Advisor: Cailey B. Condit

Relevant Coursework: Aqueous Geochemistry, Isotope Geology, Crustal Geofluids, Environmental Geochemistry, Geochemistry, Atmospheric Chemistry, Numerical Modeling, Computer Programming I (Javascript), Atmospheric Structure and Analysis (Python), Ocean Circulation and Climate (Python), Microtectonics and Rheology, Geoscience Communication

Experience

University of Texas at Austin | Breecker Lab of Stable Isotope Biogeochemistry, PI: Daniel Breecker & GeoMechanics and GeoFluids Lab, PI: Demian Saffer and Peter Flemings |
Graduate Research Assistant
08/2022 - Current

- Designing comprehensive sorption experiments to investigate the effects of temperature, pH, and lithology on boron sorption onto aluminosilicate minerals.
- Performing X-Ray Diffraction (XRD) and Brunauer-Emmet-Teller (BET) surface area analysis on both synthetic and naturally occurring aluminosilicate minerals.
- Developing robust surface complexation models using PHREEQC and MATLAB to predict boron sorption on sediments and soils over naturally occurring pH and temperature ranges with data from sorption experiments, XRD, and B.E.T.

University of Washington, Seattle | Structural Petrology of the Lithosphere Laboratory, PI: Cailey Condit |
Undergraduate Researcher
01/2021 - Current

- Researched with intent of publication progressive alteration of rocks above a paleosubduction interface in the Central Alps to constrain deformation processes from metasomatism and rheological properties within the seismogenic loading zone.
- Performed electron backscatter diffraction analysis using MTEX, scanning electron microscopy analysis, petrographic analysis on thin sections and

photomicrographs, analyzed microprobe element maps using ImageJ, and scanned full thin section photomicrographs.
- Collaborated with partners, including the head researcher and the team by dissecting and discussing published works regularly to better understand data emerging from research and experiments.

Nanohmics | Austin, TX
Atmospheric Consultant
06/2021 – 10/2021

- Acted as the sole atmospheric consultant for Nanohmics in building a suborbital low-SWaP optical sensor and imaging spectropolarimeter to measure atmospheric aerosol absorption and scattering for the NASA Jet Propulsion Laboratory.
- Digested publications on atmospheric aerosol measurements in order to find what measurements and parameters created an ideal device for NASA's research projects.
- Created reports and presented my findings to the project leads via weekly teleconferences.

University of Washington for Doctor Littke, University of Washington | Seattle, Washington
Undergraduate Research Assistant
06/2019 - 01/2021

- Prepared and performed chemical analysis of biomass samples through organic chemistry lab work.
- Used graphical analysis and statistics to conclude results from biomass samples, such as soil sample quality and content using Excel.
- Developed excellent communication skills by working directly with Doctor Littke as her sole undergraduate research assistant.

Publications and Presentations

Publications

1) Ferrie, N., Cailey, C., French, M., Ott, J. Constraining Deformation Processes in the Brittle-Ductile Transition Region Below a Subduction Seismogenic Zone, Status: *In Preparation,* Intended for submission to Geochemistry, Geophysics, Geosystems in 2023

Presentations

3) AGU Annual Meeting | 2023
Session 187637. Advances in Tracer Methods and Modeling of Hydrological Processes, Chemical Weathering, and Hydrochronology
Ferrie, N., Breecker, D., Saffer, D., Cullen, J. (2023) Predicting Boron Sorption on Aluminosilicate Minerals as Functions of Temperature and pH, Abstract #1450144, Poster to be presented at 2023 AGU Annual Meeting

2) Undergraduate Research Symposium | 2022
Session O-1K. Turf'n Surf: Science of Earth and Ocean
Ferrie, N., Cailey, C., Ott, J. (2022) Constraining Deformation Processes in the Brittle-Ductile Transition Region Below a Subduction Seismogenic Zone, Oral Presentation

1) GSA – The Joint 188th Annual Cordilleran/ 72nd Annual Rocky Mountain Section Meeting | 2022
Session T27. Undergraduate Research Poster
Ferrie, N., Cailey, C., French, M., Ott, J. (2022) Constraining Deformation Processes in the Brittle-Ductile Transition Region Below a Subduction Seismogenic Zone, Geological Society of America *Abstracts with Programs.* Vol. 54, No. 2 doi: 10.1130/abs/2022CD-374149

Teaching Experience

Earth and Space Sciences 312: Earth Materials | University of Washington, Seattle
Undergraduate Assistant
March 2022 – June 2022

● Assisted in teaching the laboratory section of this course by aiding in lecturing, providing hands on instruction, addressing inquiries, and participating in lab set up.
● Introduced students to crystallography, petrology, mineralogy, and Earth processes.
● Collaborated with teaching staff by providing feedback on laboratory midterms, finals, and insights towards the future trajectory of this course.

Field Work

Field Work | Ring Mountain, California
Graduate Researcher | GeoMechanics and GeoFluids Field Trip | PI: Demian Saffer
July 18th – 22nd, 2023
● Lead a field stop at Ring Mountain in California teaching the GeoMechanics and GeoFluids lab group about geochemical signatures of fluid flow in the Franciscan subduction complex.
● Authored sections of a collaborative field guide about geomechanics and geofluid processes within active and paleosubduction zones in California.

Field Research | Shikoku, Japan
Graduate Researcher | NSF Project: Collaborative Research: Behavior of Boron During Prograde Diagenesis and Metamorphism of Pelagic Sediments from the Nankai Trough | University of Texas at Austin | PI's: Demian Saffer & Maureen Fineman
May 8th -17th, 2023
● Collected a suite of samples for geochemical analysis ranging from ~3 km to sub arc paleodepths in the Shimanto and Sanbagawa Belts.
● Conducted geological reconnaissance across the Shimanto, Sanbagawa, Chichibu, and Ryoke belts to study subduction zone processes, including fluid release, subduction initiation, subduction erosion, metamorphism, island arc formation, accretion, trench formation, and back-arc spreading. Examined evolving paleotemperature, pressure and depth relationships, facies evolution, and structural relationships within subduction zones.
● Engaged in collaborative field work with an intercontinental team spanning multiple geologic disciplines.

Service and Outreach

Incoming Graduate Orientation Trip
Graduate Student Volunteer
August 2023
● Assisted on the new grad orientation trip by offering incoming students' guidance on graduate school, preparing meals, and offering logistical support.

STEMinist - University of Washington RSO, Seattle, Washington
Event Planning Coordinator for STEMINIST - U of WA
January 2018 – June 2021
● Coordinated outreach events with nonprofits and schools focused on increasing participation of underrecognized girls and non-binary students in STEM fields.
● Researched, initiated, and created events that foster empowerment and career enhancement for women in STEM at the University of Washington.

Mid-Sound Fisheries Enhancement Group, Seattle, Washington
Multimedia Outreach Enthusiast
September 2017 - December 2017
● Organized outreach initiatives by writing grants and reaching out to Seattle nonprofits to create partnerships in order to organize restoration and planting events.
● Practiced data entry by organizing all of Mid-Sound Fisheries past projects to be reviewed by the Government for tax-exempt status.

Honors and Awards

Dean's List **January 2020 - June 2022**

University of Washington Atmospheric Sciences Department: Academic Achievement Award **June 2022**

Skills

Lab techniques:

- Benchtop chemical analyses, BET, centrifugation, petrography, photomicrographs, electron backscatter diffraction, microprobe element maps, microscopy, quantitative data analysis, data coding and processing

Computer Skills:

- PHREEQC, MATLAB, ArcGIS, Python, Java, R-studio, ImageJ, Microsoft Excel

Communication:

- Grant writing, academic authorship, research presentations, problem solving, teamwork communication, organizational communication.

Professional Organizations

American Geophysical Union **August 2023 - Present**

Geological Society of America **January 2022 - Present**

Interests

Hiking, running, backpacking, skiing, reading, spending time with animals.