NICOLE FERRIE

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Education

The University of Texas at Austin | Austin, TX 2022-present
PhD Student, Jackson School of Geosciences
Research focus: Utilizing boron geochemical behavior to (1) source fluid release and migration pathways in shallow subduction zones and (2) improve paleo atmospheric CO_2 reconstruction using paleosols.
Areas of Study: Earthquake generation, paleoclimate proxies, boron geochemical applications, surface chemistry, chemical tracers, geochemical transport, geomechanical modeling.
Co-advisors: Daniel O. Breecker & Demian M. Saffer
Cumulative GPA: 3.74/4.0
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: Geochemistry of Subduction Zone Fluids: From Trench to Subarc, Aqueous Geochemistry, Crustal Geofluids, Environmental Geochemistry, Geochemistry, Atmospheric Chemistry, Geomechanics Seminar, Geomechanics (MATLAB), Numerical Modeling, 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

- Developing a novel, predictive model to quantify the distribution coefficient of boron adsorption on aluminosilicate materials, advancing fundamental understanding of boron geochemistry. This research has applications in drinking water purification, wastewater treatment, agricultural growth, tracking fluid flow in subduction zones, and paleoCO_2 reconstruction.

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 within the seismogenic loading zone.

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.
- Generated reports and presented findings in teleconferences on atmospheric aerosol measurements to identify key parameters for NASA's device design.

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.

Publications and Presentations

Publications

1**) Ferrie, N.,** Condit, 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 2025

Presentations

7) **Ferrie, N**., Saffer, D., Breecker, D., Hatch, B. (2024) A Predictive Model of the Distribution Coefficient of Boron Desorption: Improving the Use of Boron as a Tracer of Dewatering in Shallow Subduction Complexes, Abstract #1648531. Presented at the 2024 American Geophysical Union (AGU) Annual Meeting, Washington, D.C., 11-15 Dec.

6) **Ferrie, N.,** Breecker, D., Saffer, D., (2024) Geochemical Insights into Boron Adsorption on Clay Surfaces, Oral Presentation. Presented at UT Institute of Geophysics Discussion Hour, Austin, TX, 20 Nov.

5) Hatch, B., **Ferrie, N.,** Breecker, D., Saffer, D. (2024) Determining the Distribution Coefficient (Kd) at the Hikurangi Subduction Zone for Fluid Tracing and Expanding the Predictive Boron Adsorption Model. Presented at UT Summer Research Scholars Symposium, Austin, TX, 31 Jul.

4) **Ferrie, N.,** Saffer, D., Breecker, D. (2024) Boron Desorption as a Tracer of Dewatering in Shallow Subduction Zones. Presented at the First Joint International Earthquake Science Symposium, Austin, TX, 14-16 Feb.

3) **Ferrie, N.,** Breecker, D., Saffer, D., Cullen, J. (2023) Predicting Boron Sorption on Aluminosilicate Minerals as Functions of Temperature and pH**,** Abstract #1450144. Presented at the 2023 AGU Annual Meeting**,** San Francisco, CA, 11-15 Dec.

2) **Ferrie, N.,** Condit, C., Ott, J. (2022) Constraining Deformation Processes in the Brittle-Ductile Transition Region Below a Subduction Seismogenic Zone, Oral Presentation. Presented at the University of Washington Undergraduate Research Symposium, Seattle, WA, 20 May.

1) **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 (GSA) *Abstracts with Programs.* Vol. 54, No. 2 doi: 10.1130/abs/2022CD-374149. Presented at GSA Joint 188th Annual Cordilleran/ 72nd Annual Rocky Mountain Section Meeting, Las Vegas, NV, 15-17 Mar.

Teaching Experience

Graduate Field Assistant | Panoche Hills, CA
GEO 371T: Basin Geomechanics | University of Texas, Austin
● Synthesized and lead assignments to prepare students for field work.

● Instructed students on the emplacement process of large-scale sandstone injectites in a paleoaccretionary forearc basin through hands-on field training.

Undergraduate Teaching Assistant
Earth and Space Sciences 312: Earth Materials | University of Washington, Seattle
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 | Kenai Peninsula, Alaska
Graduate Researcher | GeoMechanics and GeoFluids Field Trip | PI: Demian Saffer
June 23rd – 28th, 2024
● Led a field stop at Crow Pass in the Chugach National Forest, focusing on geochemical signatures of gold veins as indicators of late-stage fluid mobilization in the forearc.
● Authored sections of a collaborative field guide about pre syn and post depositional tectonic process in the Kenai Peninsula of Alaska.

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

Graduate Student Executive Committee Co-President
Jackson School of Geosciences Graduate Student Executive Committee | Austin, TX
August 2024 – Current
● Oversee a 15-member board and manage an $11,000 budget to enhance professional development, foster community, and provide advisory support for 250 graduate students. (https://www.jsg.utexas.edu/academics/graduate/graduate-studies-committee/)
●Advocate for graduate students needs by collaborating with faculty, staff, and leadership to address concerns and implement solutions.
●Establishing a new faculty level Graduate Student Committee position to strengthen advisor-student relationships.

Academic Mentor
Research Experience for Undergraduates (REU) | UT Austin
February 2025 – Current
● Mentoring Kaylin Hong, a current undergraduate at UT Austin in the Jackson School of Geosciences.
● Teaching research concepts and laboratory techniques, including mortar and pestle, sieving, and centrifugation, to help Kaylin explore geochemical research as a career path and develop her undergraduate research project.

Academic Mentor
Research Traineeship Experience (RTX) | UT Austin
May 2024 – July 2024
● Mentored Bella Hatch, a current undergraduate at Colorado School of Mines, Golden, CO.
● Lead Bella through her own summer graduate research project culminating in an abstract submission and symposium presentation.
● Taught Bella graduate-level wet lab chemistry techniques, including methods for boron adsorption experiments.

Academic Mentor
Research Experience for Undergraduates (REU) | UT Austin
September 2023 - August 2024
● Mentored Mercedes Jordan, who is now a Research Engineer & Scientist Associate at UT Institute of Geophysics.

Peer Mentor Co-Chair
Jackson School of Geosciences Graduate Student Executive Committee | Austin, TX
September 2023 – May 2024
● Led a program to pair first year graduate students with late career graduate students to support their transition to graduate school.
● Organized and hosted events for mentor-mentee peers to foster connection and promote community building.

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

Event Planning Coordinator for STEMINIST - U of WA
STEMinist - University of Washington RSO | Seattle, Washington
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.

Multimedia Outreach Enthusiast
Mid-Sound Fisheries Enhancement Group | Seattle, Washington
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.

Honors and Awards

National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Honorable Mention **April 2024**
● Recognized for outstanding research proposal.

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

Skills

Lab techniques:

- Benchtop chemical analyses, Brunauer-Emmett-Teller Surface Area Analysis, X-ray Photo Electron Spectroscopy, X-Ray Diffraction, Inductively Couple Plasma Mass Spectrometry, petrography, photomicrographs, Electron Backscatter Diffraction, microprobe element maps, microscopy.

Computer Skills:

- PHREEQC, CasaXPS, MATLAB, ImageJ, Microsoft Excel

Communication:

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