

Jeremiah J. McElwee

Earth and Environmental Sciences
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Research Interests

I am mostly interested in using numerical models to study fluid-rock interaction in the lithosphere, particularly (de)hydration and fluid flow in the oceanic lithosphere, subducting plate, and mantle wedge corner. My current thesis research focuses on reaction-induced fracture during hydration of the lithosphere, and seeks to apply the results to plate boundary settings.

Education

University of Minnesota, Twin Cities
PhD, Geodynamics
Advisor: Ikuko Wada

Fall 2021 – Present

University of California, San Diego
B.S., Physics with a minor in Earth Science

Fall 2016 – Spring 2020

Research Experience

Graduate Research Assistant
ESCI at University of Minnesota, under Professor Ikuko Wada

Fall 2021 – Present

Undergraduate Research Assistant
IGPP at Scripps Institute of Oceanography, under Professor Dave Stegman

Summer 2019

Undergraduate Research Assistant
SERF at University of California, San Diego, under Doctor Carl Melis

Summer 2018

Teaching Experience

Web Accessibility Coordinator Fall 2025

Lab Instructor
ESCI 2201 (Solid Earth Course for Geology Majors)
ESCI 1003 (Introductory Dinosaur Course for Non-majors)

Fall 2021 – Present
Spring 2022

Private Algebra and Geometry Tutor Fall 2020 – Summer 2021

Manuscripts in Process

McElwee, J.J., Wada, I., Yoshida, K., Shimizu, H., Okamoto, A., Impact of differential stress on fracture due to volume increasing hydration, In Review *EGU: Solid Earth, EGU-Sphere* [Preprint], <https://doi.org/10.5194/egusphere-2025-4442>, 2025

McElwee, J.J., Wada, I., Yoshida, K., Shimizu, H., Okamoto, A., Effects of Reaction Softening and Reaction-Induced Stresses on Fracture, To be Submitted to *Geophysical Research Letters*

McElwee, J.J., Wada, I., Yoshida, K., Shimizu, H., Okamoto, A., Reaction-induced and tectonic stresses guide mantle wedge serpentinization, In Revision, To be Submitted to *Geochemistry, Geophysics, Geosystems*

Presentations

H43E “Localization of reaction-induced fracture and hydration due to reaction softening: insights from numerical simulations”

AGU Fall 2025 Poster

T43E “Effect of Confining Pressure on Reaction-Induced Fracture in the Mantle Wedge Corner”

AGU Fall 2025 Poster

“Reaction-induced fracture during hydration of the lithosphere: insights from numerical simulations”

Georgia Tech Solid Earth Seminar Fall 2025 Invited Talk

“Effects of Reaction Softening and Reaction-Induced Stresses on Fracture in the Mantle Wedge Corner”

CIG: The Next Generation Workshop Summer 2025 Poster

“Effects of Reaction Softening and Reaction-Induced Stresses on Fracture at the Base of the Mantle Wedge Corner”

Fluids in Cascadia CRESCENT Topical Workshop Spring 2025 Poster

T53C-3247 “Effects of Reaction Softening on Reaction-Induced Fracture during Serpentinization of the Forearc Mantle Wedge Corner”

AGU Fall 2024 Poster

“Tectonic and reaction-induced stresses control fracture, fluid flow, and serpentinization in the mantle wedge corner”

Montreal Fluids Workshop Spring 2024 Poster

T52B-04 “Serpentinization in the Forearc Mantle Wedge: Effects of Tectonic and Reaction-Induced Stresses on Fracture Propagation and Fluid Flow”

AGU Fall 2023 Oral

OC2-12 “Mantle wedge serpentinization in subduction zones: Effects of reaction-induced and tectonic stresses on fracture propagation and fluid flow”

WRI17/AIG14 Summer 2023

Oral

T32E-0226 “Propagation of Serpentinization in the Mantle Wedge Corner”

AGU Fall 2022

Poster

Awards and Fellowships

Outstanding Teaching Assistant 2024 – 2025

Departmental Harold Mooney Fellowship and Banerjee Fellowship 2024 - 2025

Departmental Richard Clarence Dennis Graduate Fellowship 2022 – 2023

Service

Earth and Environmental Science Confronting Colonization Working Group

Fall 2024 – Present

Earth and Environmental Science Incoming Graduate Student Mentor

Fall 2023 – Present

University of Minnesota ESCI Display Committee

Fall 2022 - Present

Graduate Student Faculty Meeting Corep

Fall 2023 - Summer 2024

University of Minnesota ESCI Outreach Committee

Fall 2021 - Summer 2023

Intermittent Elementary School, Middle School, and Museum Science Education Activities

Intermittent

Earth Science Activities for Summer Camp

Summer 2022