

## Melodie French

---

Department of Earth, Environmental and Planetary Sciences  
Rice University, Houston, TX, 77005  
(713) 348-5088  
mefrench@rice.edu

### EDUCATION

Texas A&M University	Geophysics	PhD	2014
University of Wisconsin, Madison	Geology	MS	2009
Oberlin College	Physics with honors in Geology	BA	2006

### APPOINTMENTS

2024 – present	Associate Professor, W. Maurice Ewing Career Development Chair, Rice University
1/2017 – 6/2024	Assistant Professor, Rice University
1/2015 – 1/2017	NSF Earth Sciences Postdoctoral Fellow, University of Maryland, College Park
10/2014–1/2015	Postdoctoral Scientist, University of Maryland, College Park

### SUBMITTED PUBLICATIONS

**French, M. E.**, J. R. Delph, and C. Condit, Rheologic controls on the depth-dependence of megathrust earthquakes, *in review at PNAS*

### PUBLICATIONS

† Rice Student, ‡ Rice Postdoc, ^Rice Lab Visiting Student/Data  
(since 2016)

Thomas, A. M., J. M. Watkins, N. M. Beeler, **M. E. French**, W. M. Behr, and M. H. Reed (2025), Rapid fault healing from cementation controls the dynamics of deep slow slip and tremor, *Science Advances*, doi: 10.1126/sciadv.adz2832

†Williams, S., **M. E. French**, C. Rubin, and †E. Mckenzie (2025), Using calcite deformation twins to constrain subduction-related paleostress state and deformation temperatures: A case study using the Sestola-Vidiciatico unit, *Geosphere*, doi: 10.1130/GES02897.1.

†Belzer, B., **M.E. French**, and N. J. Phillips (2025), K-Metasomatic Weakening of Oceanic Crust at Shallow Subduction Depths: Evidence from the Rodeo Cove Thrust Zone, Marin Headlands, California, *Geochemistry Geophysics, Geosystems*, doi: 10.1029/2025GC012221.

†Williams, S. and **M.E. French** (2024), Effects of Dilatant Hardening on Fault Stabilization and Structural Development, *Geophys. Res. Lett.*, doi: 10.1029/2024GL108840.

†Belzer, B. and **M.E. French** (2024), Path and slip dependent behavior of shallow subduction shear zones during fluid overpressure, *JGR Solid Earth*, doi: 10.1029/2023JB027502.

†Fliedner, C. and **M. E. French** (2023), Dispersive Elastic Moduli and Attenuation due to Wave-Induced Fluid Flow in Metapelite, *Seismica*, doi: 10.26443/seismica.v3i1.624.

†Fliedner, C. and **M. E. French** (2023), Measurements of wave-induced attenuation in saturated metapelite and the band-limitation of low-frequency earthquakes, *AGU Advances*, doi:10.1029/2022AV000837. *Article featured as an Editor's Highlight*

†Belzer, B. and **M.E. French** (2022), Frictional Constitutive Behavior of Chlorite at Low Shearing Rates and Hydrothermal Conditions, *Tectonophysics*, doi:10.1016/j.tecto.2022.229435.

‡Condit, C. and **M. E. French** (2022), Geologic Evidence of lithostatic pore fluid pressures at the base of the subduction seismogenic zone, *Geophys. Res. Lett.*, doi:10.1029/2022GL098862.

Morgan, J. K., E. A. Solomon, A. Fagereng, H. M. Savage, M. Wang, F. Meneghini, P. M. Barnes, R. Bell, **M. E. French**, N. Bangs, H. Kitajima, D. M. Saffer, L. M. Wallace (2022), Seafloor

overthrusting causes ductile fault deformation and fault sealing along the northern Hikurangi Margin, *Earth Planet. Sci. Lett.*, 593, doi:10.1016/j.epsl.2022.117651.

**French, M. E.**, W. Zhu, X. Xiaohui, B. Evans, D. J. Prior (2022), Enhanced water weakening of the Solnhofen limestone at elevated temperature, *Geophys. Res. Solid Earth*, 127, doi:10.1029/2021JB02274.

‡Condit, C., **M. E. French**, J. A. Hayles, L. Y. Yeung, E. J. Chin, and C. A. Lee (2022), Rheology of metasedimentary rocks at the base of the subduction seismogenic zone, *Geochemistry, Geophysics, Geosystems*, doi: 10.1029/2021GC010194.

†Fliedner, C. and **M. E. French** (2021), Pore and mineral fabrics control the elastic wave velocities of metapelite with implications for subduction zone tomography, *J. Geophys. Res. Solid Earth*, 126, doi:10.1029/2021JB022361.

**French, M. E.** and J. K. Morgan (2020), Pore fluid pressures and strength contrasts maintain frontal fault activity, northern Hikurangi margin, New Zealand, *Geophys. Res. Lett.*, 47, (21), doi:10.1029/2020GL089209.

‡Condit, C., V. E. Guevara, †J. R. Delph, and **M. E. French** (2020), Slab dehydration in warm subduction zones at depths of episodic slip and tremor, *Earth Planet. Sci. Lett.*, 552, doi:10.1016/j.epsl.2020.11660.

^Phillips, N., †B. Belzer, **M. E. French**, C. Rowe, and K. Ujiie (2020), Frictional strengths of subduction thrust rocks in the region of shallow slow earthquakes, *J. Geophys. Res. Solid Earth*, 125, doi: 10.1029/2019JB018888.

**French, M. E.** and †C. Condit (2019), Slip partitioning along an idealized subduction plate boundary at deep slow slip conditions, *Earth Planet. Sci. Lett.*, 528, doi: 10.1016/j.epsl.2019.115828.

Xing, T., W. Zhu, **M. E. French**, and †B. Belzer (2019), Stabilizing Effect of High Pore Fluid Pressure on Slip Behaviors of Gouge-Bearing Faults, *J. Geophys. Res. Solid Earth*, 124, doi: 10.1029/2019JB018002.

**French, M. E.**, G. Hirth, and K. Okazaki (2019), Fracture-induced pore fluid pressure weakening and dehydration in serpentinite, *Tectonophysics*, doi: 10.1016/j.tecto.2019.228168.

**French, M. E.** and J. S. Chester (2018), Localized slip and associated fluidized structures record seismic slip in clay-rich fault gouge, *J. Geophys. Res. Solid Earth*, 123, doi.org/10.1029/2018JB016053.

**French, M. E.** and W. Zhu (2017), Slow fault propagation in serpentinite under conditions of high pore fluid pressure, *Earth Planet. Sci. Lett.*, 473, (131–140), doi: 10.1016/j.epsl.2017.06.009.

**French, M. E.**, F. M. Chester, J. S. Chester, and J. E. Wilson (2016), Stress-dependent transport properties of fractured arkosic sandstone, 16(3), *Geofluids*, doi:0.1111/gfl.12174.

**French, M. E.**, W. Zhu, and J. Banker (2016), Fault slip controlled by stress path and fluid pressurization rate, *Geophys. Res. Lett.*, 43, (4330–4339), doi:10.1002/2016GL068893.

(prior to 2016)

**French, M. E.**, F. M. Chester, and J. S. Chester (2015), Micromechanisms of creep in clay-rich gouge from the Central Deforming Zone of the San Andreas Fault, *J. Geophys. Res. Solid Earth*, 120(827–849), doi:10.1002/2014JB011496.

Coble, C. G., **M. E. French**, F. M. Chester, J. S. Chester, and H. Kitajima (2014), In situ frictional properties of San Andreas Fault gouge at SAFOD, *Geophys. J. Int.*, 199(2), doi: 10.1093/gji/ggu306.

**French, M. E.**, H. Kitajima, J. S. Chester, F. M. Chester, and T. Hirose (2014), Displacement and dynamic weakening processes in smectite-rich gouge from the Central Deforming Zone of the San

Andreas Fault, *J. Geophys. Res. Solid Earth*, 119, doi:10.1002/2013JB010757.

**French, M. E.**, D. F. Boutt, and L. B. Goodwin (2012), Sample dilation and fracture in response to high pore fluid pressure and strain rate in quartz-rich sandstone and siltstone, *J. Geophys. Res.*, 117, B03215, doi:10.1029/2011JB008707.

Other Products:

Hilley, G. E. (ed.), Brodsky, E.E., Roman, D., Shillington, D. J., Brudzinski, M., Behn, M., Tobin, H. and the SZ4D RCN (including **French, M. E.**) (2022). SZ4D Implementation Plan. Stanford Digital Repository. Available at <https://purl.stanford.edu/hy589fc7561>. <https://doi.org/10.25740/hy589fc7561>.

Huntington, K.W., and Klepeis, K.A., with 66 community contributors (including **French, M. E.**) (2018), Challenges and opportunities for research in tectonics: Understanding deformation and the processes that link Earth systems, from geologic time to human time. *A community vision document submitted to the U.S. National Science Foundation*. University of Washington, 84 pp., <https://doi.org/10.6069/H52R3PQ5>.

McGuire, J., and Plank, T. , with 16 writing committee members (including **French, M. E.**) (2017), The SZ4D Initiative, Understanding the Processes that Underlie Subduction Zone Hazards in 4D, *A vision document submitted to the National Science Foundation*, 63 pp., <https://www.iris.edu/hq/files/workshops/2016/09/szo16/sz4d.pdf>.

## FUNDING

*(since July 2016)*

ACS PRF-ND (#68885), Time-Dependent Conductivity of Proppant-Filled Fractures, PI, \$125,000.

NSF EAR-FRES (#2420572), Collaborative Research: Exploring the Role of Rapid Cementation, Cohesion, and Pore Fluid Pressure Evolution in the Dynamics of Slow Slip Events, 2024-2027, co-PI, Rice budget \$407,866.

NSF EAR-IF (#2308632), TS: Research Technician to Support Growth of the Rice Rock Deformation Laboratory, 2023-2028, PI, \$728,424.

NSF Geophysics/Tectonics/Marine G&G (#1945264), CAREER: Path Dependent Slip of the Shallow Subduction Megathrust, 2020-2026, PI, \$601,711.

NSF EAR-IF (#1921517), Upgrade of a Triaxial Rock Deformation Apparatus to Measure the Rheology of Subduction Megathrusts, 2019-2021, PI, \$102,379.

NSF Geophysics (# 1759127), Controls of Pore Fluid Pressure on Fault Slip Weakening and Fracture Energy, 2018-2022, PI, \$264,839.

American Chemical Society PRF-DNI (# 59440), Frequency-Dependent Attenuation of Elastic Waves in Fault Zones, 2018-2021, PI, \$110,000.

## AWARDS AND HONORS

- Charles W. Duncan, Jr. Achievement Award for Outstanding Faculty, Rice University, 2025
- American Geophysical Union Mineral and Rock Physics Early Career Award, 2022
- NSF CAREER Award, 2020
- Editor's Citation for Excellence in Refereeing, JGR – Solid Earth, 2018, 2020
- EarthScope Distinguished Speaker Series 2015–2016
- NSF EAR Postdoctoral Fellowship 2015-2017