TIANZE LIU

tianzeliu@ucsd.edu
Institute of Geophysics and Planetary Physics
Scripps Institution of Oceanography, UC San Diego
9500 Gilman Drive, MC 0225
La Jolla, CA 92093-0225

EDUCATION

PhD Stanford University, Geophysics — Jan 2020
Advisor: Simon Klemperer

BS Peking University, Geophysics — Jul 2013

PROFESSIONAL APPOINTMENTS

2020–present **Postdoctoral Fellow**
Institute of Geophysics and Planetary Physics,
Scripps Institution of Oceanography, UC San Diego

HONORS AND AWARDS

Green Postdoctoral Scholarship — 2020–2022
UC San Diego

AGU Outstanding Student Paper Award (Poster presentation) — 2019
Tectonophysics Section, American Geophysical Union

AGU Outstanding Student Paper Award (Oral presentation) — 2015
Tectonophysics Section, American Geophysical Union

Stanford Graduate Fellowship — 2014–2017
University-wide competition, 3-year fellowship
Stanford University

PUBLICATIONS

Peer-reviewed Articles

[9] **Liu, T.**, Gong, J., Fan, W., & Lin, G. (2023) In-situ V_p/V_s ratio reveals fault zone material variation at the westernmost Gofar transform fault, East Pacific Rise. *Journal of Geophysical Research*. 128, https://doi.org/10.1029/2022JB025310

[8] **Liu, T.**, & Shearer, P. M. (2022). Likely P-to-S Conversion at the Core-Mantle Boundary Extracted From Array Processing of Noise Records. *Geophysical Research Letters*, 49(7), https://doi.org/10.1029/2021GL097034

[7] Klemperer, S. L., Zhao, P., Whyte, C. J., Darrah, T. H., Crossey, L. J., Karlstrom, K. E., **Liu, T.**, Winn, C., Hilton, D., & Ding, L. (2022). Limited underthrusting of India below Tibet: 3He/4He analysis of thermal springs locates the mantle suture in continental collision. *Proceedings of the National Academy of Sciences*, 119(12), https://doi.org/10.1073/pnas.2113877119

[6] **Liu, T.** & Shearer, P. M. (2021). Complicated lithospheric structure beneath the contiguous US revealed by teleseismic S reflections, *Journal of Geophysical Research*, *126*(5), https://doi.org/10.1029/2020JB021624

[5] **Liu, T.**, Klemperer, S. L., Yu, C. & Ning, J. (2020). Post-critical *SsPmp* and its applications to Virtual Deep Seismic Sounding (VDSS)–3: back-projection imaging of the crust–mantle boundary in a heterogeneous lithosphere, theory and application, *Geophysical Journal International*, *223*(3), https://doi.org/10.1093/gji/ggaa332

[4] Sleep, N. & **Liu, T.** (2020). Nonlinear suppression of high-frequency S waves by the near-field velocity pulse with reference to the 2002 Denali earthquake, *Journal of Geophysical Research*, *125*(1), https://doi.org/10.1029/2019JB018386

[3] **Liu, T.**, Klemperer, S. L., Ferragut, G., & Yu, C. (2019). Post-critical *SsPmp* and its applications to Virtual Deep Seismic Sounding (VDSS)–2: 1-D imaging of the crust/mantle and joint constraints with receiver functions., *Geophysical Journal International*, *219*(2), https://doi.org/10.1093/gji/ggz370

[2] **Liu, T.**, Klemperer, S. L., Yu, C., & Ning, J. (2018). Post-critical *SsPmp* and its applications to Virtual Deep Seismic Sounding (VDSS)—1: sensitivity to lithospheric 1-D and 2-D structure. *Geophysical Journal International*, *215*(2), https://doi.org/10.1093/gji/ggy307

[1] Tao, K., **Liu, T.**, Ning, J., & Niu, F. (2014). Estimating sedimentary and crustal structure using wavefield continuation: theory, techniques, and applications. *Geophysical Journal International*, *197*(1), https://doi.org/10.1093/gji/ggt515

RESEARCH PROJECTS

Imaging the lithosphere-asthenosphere system with scattered waves 2020–present
Collaborators: Peter Shearer, Vera Schulte-Pelkum

- Develop a method to image the lithosphere-asthenosphere system with teleseismic S-reverberations of deep events
- Build self-consistent anisotropic seismic models of lithospheric discontinuities with different types of scattered-wave observations
- Find lithosphere-asthenosphere boundaries and mid-lithospheric discontinuities in the contiguous US that correlate with past and present tectonic processes

Effects of pore fluids and chemical alterations on earthquake ruptures 2021–present
Collaborators: Wenyuan Fan, Jianhua Gong, Guoqing Lin

- Image V_p/V_s ratios on the Gofar Transform Fault using differential P and S travel times of earthquake clusters
- Find a higher V_p/V_s ratio in the rupture barrier zone than the rupture zone
- Find a long-term increase in V_p/V_s ratio in the rupture barrier zone prior to the 2008 mainshock

Exploring body-wave signals from ocean-solid-earth interactions 2021–present
Collaborator: Peter Shearer

- Identify both P and PKP signals from the noise generated by ocean-solid-earth interactions
- Extract reflection and conversion phases at deep discontinuities from the noise records

Post-critical *SsPmp* and its applications in imaging lithospheric structure 2013–2020
Collaborators: Simon Klemperer, Chunquan Yu, Jieyuan Ning

- Develop a back-projection method to image the crust-mantle boundary with *SsPmp* in a heterogeneous lithosphere
- Develop a PRF-VDSS joint analysis method to simultaneously determine crustal average V_p and V_p/V_s ratio
- Develop a method to derive uppermost-mantle V_p from *SsPmp*
- Model *SsPmp* amplitudes incorporating sedimentary effects

Helium isotope signature of hydrothermal systems in the Tibet Plateau 2014–present
Collaborators: Simon Klemperer, Ping Zhao, Laura Crossey, Karl Karlstrom, Thomas H. Darrah, Colin J. Whyte, Carmen Winn, Lin Ding

- Collect fluid samples from hydrothermal systems in the interior of the Tibet Plateau and measure $^3He/^4He$ ratio

- Find widespread mantle helium signature in the interior of the Tibet Plateau
- Indian plate likely subducts at a low angle beneath most of the Tibet Plateau

MENTORING EXPERIENCE

Gabriel Ferragut, IRIS summer intern from North Dakota State University 2017

- Work on *SsPmp* amplitude variation and crustal structure of the Slave Craton
- Publish a coauthored paper on *Geophysical Journal International*
- Ferragut was admitted to graduate program in earth science at the University of Oregon

Dylan Salam, military veteran, SURF summer intern from Arizona State University 2021

- Work on imaging lithospheric discontinuities beneath the Midcontient Rift with teleseismic-S reverberations.

Nic Donnellan and Joel Hurtado, military veterans, interns from San Diego Mesa College. 2022

- Work on understanding the waveforms of the 2019 Ridgecrest Earthquake

TEACHING EXPERIENCE

Journey to the Center of the Earth, teaching assistant 2019
- ~20 students enrolled, ~50% undergraduate
- Grade homework and hold discussion sessions
- Help design the term project of creating a new Wikipedia page

Reflection Seismology, teaching assistant 2017
- ~15 students enrolled, ~20% undergraduate
- Grade homework and hold discussion sessions
- Give one lecture on *Applications of Shear Waves in Seismic Explorations*

Introductory Seismology, teaching assistant 2015
- ~15 students enrolled, ~80% undergraduate
- Grade homework and hold discussion sessions
- Give one lecture on *Earthquakes and Tectonics*

SELECTED PRESENTATIONS AND INVITED LECTURES

"Spatial-temporal Evolution of In-situ V_p/V_s Ratio in the Gofar Transform Fault Zone, East Pacific Rise" Oral presentation at Seismological Society of America Annual Meeting, 2022

"Post-critical *SsPmp* and its applications" Invited talk at the Department of Geophysics, Peking University, 2020

"An intermediate bulk crustal composition of the Slave Craton: Is it a surprise?" Oral presentation at American Geophysical Union Fall Meeting, 2019.

"Post-critical *SsPmp* and its applications in Virtual Deep Seismic Sounding (VDSS)" Invited talk at Earth Resource Laboratory, MIT, 2019.

"Lithospheric structure of Ordos, China: Evidence from Virtual Deep Seismic Sounding (VDSS)" Oral presentation at American Geophysical Union Fall Meeting, 2014.

PROFESSIONAL ACTIVITIES

Primary convener, Session DI010: Interdisciplinary studies of the lithosphere-asthenosphere system, AGU Fall Meeting, 2021