Dr. Krittanon "Pond" Sirorattanakul

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Last Updated: *April 25, 2025*

Research Interest

I am deeply passionate about exploring the natural world through a multidisciplinary lens, from physics, earth sciences, and engineering. My recent work centers on the following key research questions:

- **Earthquake Physics**: *What drive earthquake sequences? How can we model and forecast them?*
- **Friction**: *What controls whether an interface will slide slowly (aseismic) or dynamically (earthquakes)?*
- **Induced Seismicity**: *How can we mitigate seismic risks associated with industrial activities?*
- **Academics and Industry:** *How can we bridge the gaps between academics and industry?*
- **Disaster Managements:** *How can we use data from social media to improve disaster managements?*

Education

2020-24 **Ph.D. Geophysics**, California Institute of Technology, CA, USA
Advisors: *Jean-Philippe Avouac, Ares J. Rosakis*
Committee: *Zachary Ross, Nadia Lapusta, Zhongwen Zhan* Defense Video
Thesis: *Response of Earthquakes to Transient Stresses, in Nature and Laboratory* PDF

2018-20 **M.S. Geophysics**, California Institute of Technology, CA, USA

2014-18 **B.S. Physics** (honors), Lehigh University, PA, USA

2014-18 **B.A. Earth & Environmental Sciences** (honors), Lehigh University, PA, USA
Advisor: *Anne Meltzer*
Thesis: *Characterization of Slip Behaviors Observed at the Bulnay Fault System* PDF

2013-14 Postgraduate Study, Brooks School, MA, USA

2010-13 High School Diploma, Mahidol Wittayanusorn School, Thailand

2007-10 Middle School Diploma, Suankularb Wittayalai School, Thailand

2001-07 Elementary School Diploma, Bangkok Christian College, Thailand

Professional Experience

Since 2024 **Geomechanics Specialist**
Chevron Technical Center, Houston, TX, USA
- Developing a physics-based workflow to model and forecast induced seismicity from wastewater injection, oil & gas production, CO2 sequestration, hydraulic stimulations.
- Leaded induced seismicity research to achieve industry leading technology.

2022, 23 (summer) **Petroleum Engineer Intern** Mentors: *Yunhui Tan, Zijun Fang*
Chevron Technical Center, Houston, TX, USA
- Implemented a novel method to estimate Gutenberg-Richter b-value statistics considering varying detection levels and integrated it into patent pending workflow (Link) for modeling and forecasting induced seismicity. Achieved stakeholder alignment on b-value ranges.

2018-24 **Graduate Research Assistant** Advisors: *Jean-Philippe Avouac, Ares Rosakis*
Seismological Laboratory and Center for Geomechanics and Mitigation of Geohazards (GMG), California Institute of Technology, Pasadena, CA, USA Link to Thesis
- Investigated the driving mechanisms of earthquake swarms.
- Identified seasonal variations of seismicity rates in California and explained them with seasonal changes of water mass due to hydrological cycles.
- Designed lab experiments to measure ultraslow slip rate (10^{-12} m/s) using digital image correlation. Discovered continuous sliding behavior of interfaces when driving stress is below the static friction threshold (published in *Nature* Link).

2021-23 **Space Technology for Earth Applications (STEA) Project Group Co-Lead** (Volunteer)
Space Generation Advisory Council (SGAC)
- Provided an interdisciplinary forum for > 450 students and young professionals from > 70 countries to discuss how space technology can be used for disaster managements.
- Investigated public sentiments using Twitter data for the aftermaths of the 2020 California Bobcat fire and the 2021 Hurricane Ida.

2018 (2 weeks) **Visiting Student** Mentor: *Shengji Wei*
Earth Observatory of Singapore, Nanyang Technological University
- Performed finite fault inversion for large earthquakes in Southeast Asia.

2017 (summer) **Educator Internship** Mentors: *Kathryn Semmens, Joan Ramage*
Nurture Nature Center, Easton, PA, USA
- Developed a Science on a Sphere lessons for middle school students.

2016 (summer) **Lee Teng Internship** Mentor: *Elvin Harms*
Fermi National Accelerator Laboratory, U.S. Department of Energy, IL, USA
- Designed graphical interfaces for monitoring tests of superconducting component.

2015-18 **Undergraduate Researcher** Mentors: *Anne Meltzer[1], Joshua Pepper[2], H. Daniel Ou-Yang[3]*
Lehigh University, Bethlehem, PA, USA
- Characterized slip behaviors of the Bulnay Fault System in Mongolia[1].
- Performed finite frequency tomography of Central Mongolia[1].
- Analyzed light curves from Cepheids and R Coronae Borealis stars[2].
- Measured diffusivity of colloids using dielectrophoresis and fluorescence microscopy[3].

2011-13 **High School Research Fellow** Mentor: *Sujint Wangsuya*
Junior Science Talent Project (JSTP), Thailand
- Measured variations of astronomical seeing using DSLR camera.

Honors and Awards

2024 GPS Award for Academic Excellence in Research, California Institute of Technology

2022, 23 Human Energy Award for creating measurable values, Chevron Corporation

2020 Finalist Team, Mars City State Design Competition, The Mars Society News

2018 24 Under 24 Leaders and Innovators in STEAM and Space, The Mars Generation News

2018 Donnel Foster Hewett Award, Earth & Environmental Sciences, Lehigh University
Awarded to senior in Earth and Environmental Sciences with greatest promise of professional achievements.

2018 Best Talk, Undergraduate Research Symposium, Earth & Env. Sci., Lehigh University

2016 Malcolm J. Gordon, Jr. Physics Prize, Department of Physics, Lehigh University
Awarded to top-ranking sophomore majoring in physics with some extracurricular activities.

2012 Gold Medal (Physics), Asia Pacific Conference of Young Scientists (APCYS), Indonesia

2012 Commendation Award, Singapore International Mathematics Challenge (SIMC)

2012 Quarterfinalist Team, Wittaya Subphayuth, Thailand National Science TV Game Show Youtube

2011 Bronze Medal, 5th International Olympiad on Astronomy and Astrophysics (IOAA), Poland Link

2011 Gold Medal, 8th Thailand Astronomy Olympiad (TAO)

2011 National Outstanding Youth, Thailand

2010 Bronze Medal, 4th International Olympiad on Astronomy and Astrophysics (IOAA), China Link

2010 Silver Medal, 10th Thailand Physics Olympiad (TPhO)

Fellowships and Grants

2019-24 Caltech GMG Center Project GMG-6: Experimental Investigation of the Interaction between Fluids and Failure of Rock Faults in Shear ($306,000), PI: *Ares J. Rosakis* Link
K.S. contributed to proposal writing and execution of the work.

2018-19 Caltech Graduate Fellowship

2013-18 Royal Thai Scholarship for Undergraduate Studies

2017 Grant for Experiential Learning in Health (GELH), Lehigh University ($5,420)

2015-16 CAS Undergraduate Research Grant, Lehigh University ($2,050)

2011-12 Young Scientist Competition (YSC), NSTDA, Thailand

Peer-Reviewed Publications (feel free to send me a request for full-text on ResearchGate)

In Preparation

[9] **Sirorattanakul, K.**, Rubino, V., Lattanzi, A., Rosakis, A. J., Experimental Quantification of Ultralow Slip Rate of Shear Interfaces Using Digital Image Correlation, In Preparation for *Experimental Mechanics*.

[8] **Sirorattanakul, K.**, Avouac, J.-P., Earthquake Nucleation Process Revealed by Modulation of Seismicity Rate in California driven by Tectonic, Hydrological, and Tidal Loading, In Preparation.

Published

[7] Li, Y., Acosta, M., **Sirorattanakul, K.**, Bourne, S. J., Avouac, J.-P. (2025), Geodetic Monitoring of Elastic and Inelastic Deformation in Compacting Reservoirs due to Subsurface Operations, *Journal of Geophysical Research: Solid Earth* 130(3), e2024JB030794. Link

[6] **Sirorattanakul, K.**, Larochelle, S., Rubino, V., Lapusta, N., Rosakis, A. J. (2025), Sliding and Healing of Shear Interfaces that Appear Stationary, *Nature* 639, 947-953. Link Caltech Press

[5] **Sirorattanakul, K.**, Wilding, J., Acosta, M., Li, Y., Ross, Z. E., Bourne, S. J., van Elk, J., Avouac, J.-P. (2024), Bursts of Fast Propagating Swarms of Induced Earthquakes at the Groningen Gas Field, *Seismological Research Letters*, 96(1), 130-146. Link

[4] Acosta, M., Avouac, J.-P., Smith, J. D., **Sirorattanakul, K.**, Kaveh, H., Bourne, S. J. (2023), Earthquake Nucleation Characteristics Revealed by Seismicity Response to Seasonal Stress Variations Induced by Gas Production at Groningen, *Geophysical Research Letters*, 50(19), e2023GL105455. Link

[3] **Sirorattanakul, K.**, Ross, Z. E., Khoshmanesh, M., Cochran, E. S., Acosta, M. and Avouac, J.-P. (2022), The 2020 Westmorland, California Earthquake Swarm as Aftershocks of a Slow Slip Event Sustained by Fluid Flow, *Journal of Geophysical Research: Solid Earth*, 127(11), e2022JB024693. Link

[2] Hough, S. E., Thompson, E., Parker, G. A., Graves, R. W., Hudnut, K. W., Patton, J., Dawson, T., Ladinsky, T., Oskin, M., **Sirorattanakul, K.**, Blake, K., Baltay, A. and Cochran, E. (2020), Near-Field Ground Motions from the July 2019 Ridgecrest, California, Earthquake Sequence, *Seismological Research Letters*, 91(3), 1542-1555. Link

[1] **Sirorattanakul, K.**, Engle, S., Pepper, J., Wells, M., Laney, C. D., Rodriguez, J. E. and Stassun, K. G. (2017), Period Variations for the Cepheid VZ Cyg, *The Astronomical Journal*, 154(6). Link

Book Chapter and Technical Reports

[3] **Sirorattanakul, K.** et al. (2021), Perceptions of Space-Related Non-Governmental Organizations in Disaster Risk Management Revealed from a Questionnaire-Based Study, *Space Generation Advisory Council Project Report*, 1-18. PDF

[2] Abdeljelil, N. et al. (incl. **Sirorattanakul, K.**) (2020), The Design of City States on Mars, a Vision from SGAC, In Crossman, F. (Eds.), *Mars City States –New Societies for a New World* (pp. 431-462), Lakewood, Colorado: Polaris Books. Amazon

[1] **Sirorattanakul, K.** and Harms, E. (2016), Preparation of LCLS-II 1.3 GHz Prototype Cryomodule Testing at Fermilab, *Final report for Lee Teng Undergraduate Internship in Accelerator Science and Engineering*, Batavia, IL, USA. PDF

Conference Proceedings (with extended abstracts or short papers)

[6] **Sirorattanakul, K.**, Rubino, V., Lattanzi, A., Rosakis, A. J., Experimental Quantification of Ultraslow Slip Rate of Shear Interfaces Using Digital Image Correlation, *PhotoMechanics – iDICs Conference*, Clermont-Ferrand, France, October 29-31, 2024, Oral Presentation. [Presented by V. Rubino]

[5] Mukherjee, S., **Sirorattanakul, K.**, Schalles, V., Integrating Satellite Imagery and Social Media Data to Study the Socio-economic Aftermaths of 2021 Hurricane Ida, *73rd International Astronautical Congress*, Paris, France, September 18-22, 2021, Oral Presentation B5.2.10. PDF

[4] Okolie, C. J. et al. (incl. **Sirorattanakul, K.**), Evaluation of Flood Susceptibility in Douala Estuary Cameroon using GIS, Remote Sensing, and Logistic Regression, *73rd International Astronautical Congress*, Paris, France, September 18-22, 2021, Interactive Presentation B1.IP.22. PDF

[3] Mukherjee, S., **Sirorattanakul, K.**, Vargas-Sanabria, D., Patial, S., Silwal, A., Atienza, K. J., Supplementing Earth Observation with Twitter data to Improve Disaster Assessments: A Case Study of 2020 Bobcat Fire in Southern California, *72th International Astronautical Congress*, Dubai, UAE, October 25-29, 2021, Oral Presentation B1.5.9. PDF

[2] Muhire, D., Mukherjee, S., **Sirorattanakul, K.** et al., Integrating Social Media and Remote Sensing Data for Flood Assessment in Developing Countries: A Case Study in Douala Estuary, Cameroon, *72th International Astronautical Congress*, Dubai, UAE, October 25-29, 2021, Oral Presentation B1.5.9. PDF

[1] Velterop, E, Sirorattanakul, K., Novellino A. et al., Current and Near-Future State of Space Technology for Disaster Situations, *70th International Astronautical Congress*, Washington, DC, USA, October 21-25, 2019, Oral Presentation B1.1.11. PDF

Patent

[1] Fang, Z., Tan, Y., Rijken, M. C. M. and **Sirorattanakul, K.**, Pressure and Stress Driven Induced Seismicity History Matching and Forecasting, *World Intellectual Property Organization Patent Application No. WO2024026497(A1)*, filed by Chevron Corporation on July 28, 2023, patent pending. Link

Press and Media Coverage

2025 Interview on Thai PBS (Thailand National TV station) about the 2025 M_w 7.7 Myanmar earthquake and earthquake preparedness Youtube (at ~ 1:24 hr) With translation to English

2025 "Everything Flows: Redefining the Laws of Friction in Caltech's Seismological Wind Tunnel" for our *Nature* article Caltech News Phys.org Pasadena Now Malevus WeChat Blog (Chinese)

Invited Talks and Seminars

03/2025 Industrial Advisory Board Meeting, Geomechanics and Mitigation of Geohazards (GMG), California Institute of Technology

12/2024 Sponsor Project Meetings, Center for Integrated Seismicity Research (CISR), UT Austin

10/2024 ITI-GeoT Seminar, University of Strasbourg, France [Virtual]

03/2024 Industrial Advisory Board Meeting, Geomechanics and Mitigation of Geohazards (GMG), California Institute of Technology

11/2023 Lithospheric Dynamics Seminar, University of Southern California (USC) Link

10/2022 Special Seminar, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland

08/2022 Geomechanics Chapter, Chevron Technical Center, Houston, TX, USA

04/2022 Geophysics Seminar, University of California, Los Angeles (UCLA) Link

04/2020 Deep Dive Meeting, Geomechanics and Mitigation of Geohazards (GMG), Caltech [Virtual]

03/2020 James K. Knowles Lectures and Solid Mechanics Symposium, Caltech Link

02/2018 Lehigh Valley Amateur Astronomical Society (LVAAS), Allentown, PA, USA Link

First-Authored Conference Presentations

[17] **Sirorattanakul, K.**, Fang, Z., An, J., Ruby, N., Tavakoli, R., Palmer, J. and Comiskey, C., Modeling and Forecasting Wastewater Disposal Induced Seismicity in the Delaware Basin, *Seismological Society of America Annual Meeting*, Baltimore, USA, April 14-18, 2025, Oral Presentation. Abstract

[16] **Sirorattanakul, K.**, Larochelle, S., Rubino, V., Lapusta, N. and Rosakis, A. J., Sliding and Healing of Shear Interfaces that Appear Stationary, *Seismological Society of America Annual Meeting*, Baltimore, USA, April 14-18, 2025, Poster Presentation. Abstract

[15] **Sirorattanakul, K.** and Avouac, J.-P., Earthquake Nucleation Process Revealed by Modulation of Seismicity Rate in California Driven by Tectonic, Hydrological and Tidal Loading, *American Geophysical Union Fall Meeting*, San Francisco, USA, December 9-13, 2024, Poster Presentation S43B-3427. Abstract

[14] **Sirorattanakul, K.** and Avouac, J.-P., Constraining Earthquake Nucleation Using Response of Seismicity to Transient Slow-Slip Event and Hydrological Surface Load, *Seismological Society of America Annual Meeting*, Anchorage, USA, April 29 – May 3, 2024, Poster 186. Abstract

[13] **Sirorattanakul, K.** and Avouac, J.-P., Seasonal and Tidal Modulations of Seismicity Rate in California, *American Geophysical Union Fall Meeting*, San Francisco, USA, December 11-15, 2023, Oral Presentation S44C-04. Abstract

[12] **Sirorattanakul, K.**, Ross, Z. E., Khoshmanesh, M., Cochran, E. S. and Avouac, J.-P., The 2020 Westmorland, California Earthquake Swarm as Aftershocks of a Slow Slip Event Sustained by Fluid Flow, *American Geophysical Union Fall Meeting*, Chicago, IL, USA, December 12-16, 2022, Oral Presentation S56A-02. Abstract

[11] **Sirorattanakul, K.**, Ross, Z. E., Khoshmanesh, M., Cochran, E. S. and Avouac, J.-P., The 2020 Westmorland, California Earthquake Swarm as Aftershocks of a Slow Slip Event Sustained by Fluid Flow, *Statistical Seismology International Conference*, Cargese, France, October 17-21, 2022, Oral Presentation.

[10] **Sirorattanakul, K.**, Ross, Z. E., Khoshmanesh, M., Cochran, E. S. and Avouac, J.-P., The 2020 Westmorland, California Earthquake Swarm as Aftershocks of a Slow Slip Event Sustained by Fluid Flow, *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 11-14, 2022, Poster 69. Poster

[9] **Sirorattanakul, K.**, Ross, Z. E., Khoshmanesh, M., Cochran, E. S. and Avouac, J.-P., The 2020 Westmorland Swarm in the Salton trough, California as a Sequence of Non-Interacting Earthquakes Driven by Preceding Aseismic Slip Transient, *American Geophysical Union Fall Meeting*, New Orleans, LA, USA, December 13-17, 2021, Oral Presentation S44C-07. Abstract

[8] **Sirorattanakul, K.**, Gualandi, A. and Avouac, J.-P., Imaging Slow-Slip Events in Costa Rica, *American Geophysical Union Fall Meeting*, San Francisco, CA, USA, December 9-13, 2019, Poster T13D-0308. Abstract

[7] **Sirorattanakul, K.**, Gualandi, A. and Avouac, J.-P., Imaging Slow-Slip Events in Costa Rica, *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 8-11, 2019, Poster 201. Abstract

[6] **Sirorattanakul, K.**, Meltzer A. and Stachnik, J., Characterization of Slip Behaviors Observed at the Bulnay Fault System in Mongolia, *Lehigh EES Undergraduate Research Symposium*, Bethlehem, PA, USA, May 4, 2018, Oral Presentation.

[5] **Sirorattanakul, K.**, Shen, C., Huang, H. and Ou-Yang H. D., Osmotic Compressibility of Colloidal Crystals and Suspensions Measured by Dielectrophoresis and Fluorescence Microscopy, *American Physical Society March Meeting*, Los Angeles, CA, USA, March 5-9, 2018, Poster L60.165. Abstract

[4] **Sirorattanakul, K.**, Herrick, S., Survey of Rural Communities in San Juan Del Sur Area, Nicaragua for Lehigh's Engineers without Borders, Grants for Experiential Learning in Health Student Recipient Presentations, Lehigh University, October 3, 2017.

[3] **Sirorattanakul, K.**, Pepper, J. and Clayton G. C., KELT Photometric Observations of R Coronae Borealis Variables, *American Astronomical Society Meeting #230,* Austin, TX, USA, June 4-8, 2017, Poster 217.05. Abstract

[2] **Sirorattanakul, K.**, Shen, C. and Ou-Yang, H. D., A New Technique for Measuring Concentration Dependence of Self and Collective Diffusivity by Using a Single Sample, *American Physical Society March Meeting*, New Orleans, LA, USA, March 13-17, 2017, Oral Presentation R17.10. Abstract

[1] **Sirorattanakul, K.**, Huang, H., Uhl, C. and Ou-Yang, H. D., On Determination of Equation of State of Colloidal Suspensions, *American Physical Society March Meeting*, Baltimore, MD, USA, March 14-18, 2016, Oral Presentation R17.10. Abstract

Nth-Authored Conference Presentations

[12] Alghannam, M., Lapusta, N., Rosakis, A., Larochelle, S., Rubino, V., **Sirorattanakul, K.**, Lattanzi, A., Rate-and-State Simulations of Fluid-Injection Laboratory Experiments, *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 8-11, 2024, Group B Poster 160. Abstract

[11] Li, Y., Acosta, M., **Sirorattanakul, K.**, Bourne, S. J., Avouac, J.-P., Advanced InSAR Analysis of Groningen's Subsurface Deformation: Enhancing Understanding of Reservoir Rheology and Induced Seismicity Modeling, *Seismological Society of America Annual Meeting*, Anchorage, USA, April 29 – May 3, 2024, Oral Presentation. Abstract

[10] Alghannam, M., Larochelle, S., Lapusta, N., Rubino, V., **Sirorattanakul, K.**, Lattanzi, A., Rosakis, A., Dependence of Rupture Nucleation and Propagation on Fluid Injection Rate: Effective Stress vs. Variations in Friction Properties, *American Geophysical Union Fall Meeting*, San Francisco, USA, December 11-15, 2023, Poster S51F-0267. Abstract

[9] Li, Y., Acosta, M., **Sirorattanakul, K.**, Avouac, J.-P., InSAR Monitoring of Ground Deformation due to Subsurface Reservoir Operations at Groningen, *American Geophysical Union Fall Meeting*, San Francisco, USA, December 11-15, 2023, eLightning G24B-07. Abstract

[8] Acosta, M., Avouac, J.-P., Smith, J. D., **Sirorattanakul, K.**, Kaveh, H., Bourne, S. J., Earthquake Nucleation Characteristics Revealed by the Effect of Short-and-Long-Term Stress Variations on Induced Seismicity, *American Geophysical Union Fall Meeting*, San Francisco, USA, December 11-15, 2023, Oral Presentation S22B-04. Abstract

[7] Alghannam, M., Larochelle, S., Lapusta, N., Rubino, V., **Sirorattanakul, K.**, Lattanzi, A., Rosakis, A., Dependence of Rupture Nucleation and Propagation on Fluid Injection Rate: Effective Stress vs. Variations in Frictional Properties, *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 10-12, 2023, Group A Poster 211. Abstract

[6] Li, Y., Acosta, M., **Sirorattanakul, K.**, Bourne, S., Avouac, J.-P., InSAR Monitoring of Ground Deformation due to Subsurface Reservoir Operations at Groningen, *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 10-12, 2023, Group B Poster 150. Abstract

[5] Acosta, M., Avouac, J.-P., Smith, J. D., **Sirorattanakul, K.**, Kaveh, H., Bourne, S. J., Earthquake Nucleation Characteristics Revealed by the Effect of Short-and-Long-Term Stress Variations on Induced Seismicity *Southern California Earthquake Center (SCEC) Annual Meeting*, Palm Spring, CA, USA, September 10-12, 2023, Group B Poster 156. Abstract

[4] Penney, C., **Sirorattanakul, K.** and Avouac, J.-P., Rheological Implications of Post-Seismic Deformation following the 2019 Ridgecrest Earthquakes, *American Geophysical Union Fall Meeting*, Online, December 1-17, 2020, Poster MR010-0008. Poster

[3] Hough, S. E. et al. (incl. **Sirorattanakul, K.**), Near-Field Ground Motions from the 2019 M6.4 and M7.1 Ridgecrest, California, Earthquakes: Subdued Shaking due to Pervasive Non-Linear Site Response?, *American Geophysical Fall Meeting*, San Francisco, CA, USA, December 9-13, 2019, Oral Presentation S42C-01. Abstract

[2] Traphagen, J., **Sirorattanakul, K.**, Cui, Z. and Meltzer, A., Probing Central Mongolia with Finite Frequency Tomography, *Lehigh EES Undergraduate Research Symposium*, Bethlehem, PA, USA, May 5, 2017, Poster Presentation.

[1] Shen, C., **Sirorattanakul, K.**, Huang, H. and Ou-Yang, H. D., An Experimental Study of the Equation of State of Nano Colloids Using a Novel Dielectrophoresis Osmometer, *American Physical Society March Meeting*, New Orleans, LA, USA, March 13-17, 2017, Oral Presentation S17.7. Abstract

Field Experience

2024	Caltech Pahoehoe Field Trip, Big Island, Hawaii (6 days; leaded by Paul Asimow)
2023	Caltech Enrichment Trip, Iceland (12 days; leaded by Paul Asimow)
2023	San Andreas Fault & Ridgecrest Ruptures, Co-leaded with Jean-Philippe Avouac (1 day)
2022	Seismic, Resistivity, Gravity, GPR, GPS, and Magnetic Surveys of Garlock Fault, USA (2 days; TA for Caltech Ge111b class) Link
2020	Geological Mapping of Piru Gorge Sandstone, Pyramid Lake, CA, USA (6 days; Caltech Ge121b; leaded by John Grotzinger)
2019	Boat Surveys and Sedimentology of Wax Lake Delta, LA, USA (7 days; Caltech Ge121a; leaded by Michael Lamb)
2019,22	Seismic Nodal Deployment & Retrieval, Los Angeles Basin, CA, USA (3 days) Link
2019	Survey of Displaced Rocks following M7.1 Ridgecrest Earthquake, CA, USA (1 day) Paper
2019	Geological Mapping of Emigrant Gap Composite Pluton, CA, USA (18 days)
2019	Seismic, Resistivity, Gravity, GPR, and GPS Surveys of Homestead Valley Fault, USA (2 days; Ge111b class; leaded by Rob Clayton and Mark Simons) Link
2018,22	Drone Surveys of Owens Valley Fault System, CA, USA (19 days; Caltech Ge121a by Jean-Philippe Avouac; one time as student and another as TA)
2018	Lehigh in Costa Rica Study Abroad Program on Sustainable Development (22 days)
2017	Seismometer Deployment, Rapid Response for M4.2 Delaware Earthquake, USA (1 day)
2017	Social Science Survey for Engineer Without Borders, Nicaragua (19 days)

Workshops / Short Courses

Since 2024	Horizon Earth Science Program, Chevron Corporation *Introduction to Petrophysics, INTERSECT with Petrel RE, Geomechanics for Shale & Tight, Pressure-Rate Transient Analysis, Kinetix Shale Hydraulic Fracture Design (by SLB), Hydraulic Fracture Test Site (HFTS-2) Core Workshop*
2023	First Aid/CPR/AED Training, American Red Cross, Caltech, CA, USA
2022	SCEC Workshop: Coordinating Post-Earthquake Field Data Collection [Virtual] Link
2021	ADVANCEGeo Bystander Intervention Workshop, Caltech, CA, USA Link
2021	SCEC Workshop: Community Geodetic Model Workshop [Virtual] Link
2021	SCEC-IRIS-UNAVCO Workshop: Rupture and Fault Zone Observatory (RuFZO) [Virtual] Link
2020	Remote Online Sessions for Emerging Seismologists (ROSES) [Virtual] Link
2018	NSF Workshop: Modeling Earthquake Source Processes, Pasadena, CA, USA
2016	Accelerator Fundamentals, U.S. Particle Accelerator School, Fort Collins, CO, USA
2015	Princeton in Beijing (4-week summer intensive Chinese language course)
2012	Asian Science Camp (ASC), Jerusalem, Israel (as a representative from Thailand)
2012	International Symposium on Green Growth, Hana Academy, Seoul, South Korea

Synergistic Activities

Since 2025 Technical Talks Organizing Committee Geomechanics Community of Practice (CoP), Chevron

2024 Organizing Committee, James K. Knowles Lectures and Caltech Solid Mechanics Symposium

2020-21 Organizing Committee, Caltech Seismolab Weekly Seminar

Journal Reviewer for

Earth and Planetary Science Letters (n=1), *Geology (n=1)*, *Geophysical Research Letters (n=1)*, *Journal of Geophysical Research: Solid Earth (n=2), Physics of the Earth and Planetary Interiors (n=1)*, *Seismological Research Letters (n=1)*

Co-convener for:

"*Advanced Geophysical Observations, Analytical Methods, and New Insights for Earthquake Swarms*" at Seismological Society of America Annual Meeting 2025

Judge for:

2025 Student Presentation Award, Seismological Society of America (SSA) Annual Meeting

2024 Outstanding Student Presentation Award (OSPA), AGU Fall Meeting

2019-20 Perpall Speaker and Gee Poster Competition, Undergrad SURF program, Caltech

Teaching

2020-24 **Graduate Teaching Assistant**, Caltech

- Static and Dynamic Failure of Brittle Solids and Interfaces (Ae265a; Rosakis) – Winter 24
- Applied Geophysics Seminar and Field Course (Ge111b; Clayton & Simons) – Spring 22
- Advanced Field Geology (Ge121a; Avouac) – Fall 22
- Active Tectonics (Ge177; Avouac) – Spring 20, Spring 22

2016-18 **Undergraduate Grader**, Lehigh University

- Linear Methods (MATH205)
- Introduction to Astronomy (ASTR007)

2015-18 **Peer Tutors**, Center for Academic Success, Lehigh University

- Introductory Physics (PHY010, PHY011, PHY012, PHY013, PHY021, PHY022)
- Calculus (MATH021, MATH022, MATH023)
- Linear Algebra (MATH205)

Community Involvements and Leadership

2019-23 Event Supervisor and Test Writer, Los Angeles Regional Tournament and Southern California State Tournament, Science Olympiad Inc., USA

2022-23 Board of Directors, Graduate Student Council (GSC), Caltech

2021-22 Geological and Planetary Sciences Outreach (GO) Outdoors program, Caltech

2018-23 Social Media Manager, Caltech Letters

2016-18 President, Astronomy Club, Lehigh University

2016-18 President, Southeast Asia at Lehigh (SEAL) club, Lehigh University

2015-17 Secretary, Society of Physics Students (SPS), Lehigh University

2015-16 Recruitment Chair, the Lehigh University (LU) Diplomats

Professional Associations

Since 2024	Seismological Society of America (SSA)
Since 2018	American Geophysical Union (AGU)
2018-24	The Center for Geomechanics and Mitigation of Geohazards (GMG), Caltech
2018-23	Space Generation Advisory Council (SGAC)
2016-18	American Physical Society (APS)
2016-18	Lehigh Valley Amateur Astronomical Society (LVAAS)
2014-18	Society of Physics Students (SPS), Lehigh University Student Chapter
2014-18	Engineers without Borders (EWB), Lehigh University Student Chapter

Technical Skills

- **Operating Systems:** *Windows, Macintosh, Linux (Ubuntu, Solaris)*
- **Programming Languages:** *MATLAB, python, UNIX/shell, CUDA C/C++, java, LabVIEW, GMT*
- **Python Packages:** *Tensorflow, Keras, sklearn, nltk, TextBlob, Numba, pandas, NumPy, ObsPy*
- **General Softwares:** *Google Colab, Jupyter Notebook, Git, SolidWorks, ArcGIS, QGIS, ENVI, Google Earth*
- **Oil & Gas Industry Softwares:** *Petrel, INTERSECT, ParaGeo, HyperMesh, Kinetix, KAPPA*
- **Lab Instruments:** *High-Speed Optical Imaging (HPV-X), Velocimeters, Oscilloscope, Signal Generator, Electron Microscopy (SEM JEOL JSM-840A, TEM JEOL JEM-1200EX), Olympus Confocal FV1000, Photolithography*