

Stacy Larochele

Postdoctoral Research Scientist

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Education	Ph.D. in Geophysics California Institute of Technology, CA, USA	2022
	M.S. in Geophysics California Institute of Technology, CA, USA	2018
	B.Eng. in Civil Engineering McGill University, QC, Canada	2016
Research Experience	Postdoctoral Research Scientist LDEO, Columbia University, NY, USA <i>Impact of meltwater and groundwater on ice-sheet dynamics</i> Mentors: Jonathan Kingslake, Meredith Nettles, Laura Stevens (Oxford)	2022-
	Graduate Researcher California Institute of Technology, CA, USA <i>Mechanical interactions between water and the solid Earth: From quasi-static geodetic deformation to dynamic fault slip</i> Advisors: Jean-Philippe Avouac, Nadia Lapusta	2016-22
	Visiting Graduate Researcher IGN, IPGP, and ENS Paris, France <i>Geodetic insight into aquifer mechanics</i> Mentors: Kristel Chanard, Luce Fleitout, Jérôme Fortin	Fall 2019
	Géoazur, Université Côte d'Azur, France <i>Fault slip modeling of a fluid-injection experiment</i> Mentors: Jean-Paul Ampuero, Frédéric Cappa	July 2019
	Undergraduate Researcher McGill University, QC, Canada	
	1. <i>Poroelastic stress field due to hydraulic fracturing</i>	Fall 2015
	2. <i>Fluid flow through fractured and intact limestone</i>	Summer 2015
3. <i>Seismic performance of concrete frame structure</i>	Summer 2014	
Advisors: 1. Yajing Liu, 2. Patrick Selvadurai, 3. Denis Mitchell		

Publications **In preparation:**

Larochelle, S., Stevens, L. A., Nettles, M., Kingslake, J., Lu, G., Lau, N., Behn, M. D., Fan, W., Das, S. B., Synchronous hydro-fracture-driven drainages of neighboring supraglacial lakes in West Greenland. In preparation (expected 2024).

Larochelle, S., Ampuero, J.-P., Lapusta, N., & Lambert, V., Fluid-induced slip and earthquake nucleation on an aging rate-and-state fault. In preparation (to be submitted in October 2023).

Submitted:

Sirorattanakul, K., Larochelle, S., Rubino, V., Rosakis, A. J., & Lapusta, N. Contact interfaces under shear: no static friction? Submitted to *Science*.

Larochelle, S., Chanard, K., Dalaison, M., Fortin, J., Longuevergne, L., Fleitout, L., Argus, D. F., Gauer, L.-M., Jolivet, R., & Avouac, J.-P., The abrupt, drought-driven collapse of California's Sacramento Valley aquifer. In revision for transfer at *Nature Communications*.

Stevens, L. A., Das, S. B., Behn, M. D., McGuire, J. J., Lai, C.-Y., Joughin, I., Larochelle, S., Nettles, M., Kingslake, J., Stress coupling between supraglacial lakes. In revision for *Journal of Geophysical Research: Earth Surface*.

Published:

Larochelle, S., Chanard, K., Fleitout, L., Fortin, J., Gualandi, A., Longuevergne, L., Rebischung, P., Violette, S., & Avouac, J.-P. (2022). Understanding the geodetic signature of large aquifer systems: Example of the Ozark Plateaus in central United States. *Journal of Geophysical Research: Solid Earth*, 127, doi:10.1029/2021JB023097

Michel, S., Jolivet, R., Lengliné, O., Gualandi, A., Larochelle, S., & Gardonio, B. (2022). Searching for transient slow slips along the San Andreas Fault near Parkfield using independent component analysis. *Journal of Geophysical Research: Solid Earth*, 127, doi:10.1029/2021JB023201

Larochelle, S., Lapusta, N., Ampuero, J.-P., & Cappa, F. (2021). Constraining fault friction and stability with fluid-injection field experiments. *Geophysical Research Letters*, 48, doi:10.1029/2020GL091188

Larochelle, S., Gualandi, A., Chanard, K., & Avouac, J.-P. (2018). Identification and extraction of seasonal geodetic signals due to surface load variations. *Journal of Geophysical Research: Solid Earth*, 123, doi:10.1029/2018JB016607

Dissertation & Reports:

Larochelle, S. (2022). Mechanical Interactions Between Water and the Solid Earth: from Quasi-Static Geodetic Deformation to Dynamic Fault Slip. Dissertation (Ph.D.), California Institute of Technology, doi:10.7907/2r5a-9277

Lapusta, N., Dunham, E., Avouac, J.-P., Denolle, M., van Dinther, Y., Faulkner, D., Fialko, Y., Kitajima, H., Lambert, V., Larochelle, S., et al. (2019). Modeling Earthquake Source Processes (MESP): from Tectonics to Dynamic Rupture, Report to the National Science Foundation.

Larochelle, S., Liu, Y., & Kao, H. (2016). Poroelastic modeling of hydraulic fracturing induced earthquake stress field. Geological Survey of Canada, Open File 8028. doi:10.4095/297811

Grants	NSF Office of Polar Programs, Antarctic Sciences <i>Modeling the coupled dynamics of groundwater, subglacial hydrology and ice sheets</i> (\$356,512 requested) PI: <u>Stacy Larochelle</u> , Co-PI: Jonathan Kingslake	Pending (Submitted July 2023)
Fellowships & Scholarships	STEM Chateaubriand Fellowship (€3,245) Embassy of France in the United States	2019-20
	Postgraduate Scholarship - Doctoral (C\$63,000) National Sci. and Eng. Research Council of Canada	2018-21
	Gutenberg Fellowship (\$30,000) Seismological Laboratory, California Institute of Technology	2016-17
	Gordon Hunt Engineering Scholarship (C\$3,000) McGill University	2015-16
	Undergraduate Research Student Awards x2 (C\$9,000) National Sci. and Eng. Research Council of Canada	2014-15
	Hydro-Québec Engineering Scholarship (C\$15,000) McGill University	2012-15
Awards & Honors	Demetriades-Tsafka-Kokkalis Ph.D. Thesis Award, Caltech	2022
	Student Presentation Award, Seismological Society of America	2021
	Richard H. Jahns Teaching Award, Caltech	2019
	Teaching Quality Report Feedback Registrar Recognition, Caltech	2019
	Outstanding Student Presentation Award, AGU	2018
	British Association Medal, McGill	2016
	Summer Undergraduate Research in Eng. Poster Award, McGill	2015
	Dean's Honor List, McGill	2012-16

Fieldwork	Supraglacial Lakes on West Greenland Ice Sheet (7 weeks) Maintenance and recovery of on-ice GNSS, ice-penetrating radar, and water pressure instruments. Helicopter field survey of hydro-fracture features.	Summer 2023
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Teaching	Student: Caltech E110 - <i>Principles of University Teaching and Learning in STEM</i>	2021
	Teaching Assistant: Caltech ME/Ge/Ae 102a/160 - <i>Continuum Mechanics</i> Caltech ME/Ge/Ae 266 - <i>Dynamic Fracture & Frictional Faulting</i> Caltech Ge 162 - <i>Introduction to Seismology</i> Caltech Ge/ESE 118 - <i>Introduction to Data Analysis</i> Caltech Ge 1 - <i>Introduction to Earth Sciences</i> McGill CIVE 210 - <i>Surveying</i> (field class) McGill FACC 300 - <i>Engineering Economy</i>	2020 2020 2019 2018 2018 2016 2015-16

Service	Professional: Session co-convener (G006), AGU Fall Meeting Early career representative of AGU Geodesy Section Student representative of AGU Geodesy Section Organizing Committee of MESP Workshop Reviewer for <i>EPSL</i> , <i>Geophysical Journal International</i> , <i>JGR: Solid Earth</i> , <i>Pure and Applied Geophysics</i> , <i>Remote Sensing</i> , <i>Remote Sensing of Environment</i> , and <i>Tectonics</i>	2023 2022- 2021-22 2018 2018-
	University: MPG/SGT (Geophysics) Seminar Organizing Committee, LDEO GPS Local Student Committee, Caltech Seismo Lab Seminars Organizing Committee, Caltech Women in GPS (WinGs) Treasurer, Caltech Graduate Student Council Board of Directors, Caltech Graduate Student Council Social Committee, Caltech	2023- 2019-20 2018-19 2018-20 2017-19 2016-19
	Community: Lamont-Doherty Earth Observatory Open House Graphic designer for Pasadena Tenant Union Caltech Y tutoring for Pasadena high schools Caltech GPS Future Ignited mentoring program	2022 2022 2021 2020

Invited Talks

Seminars:

Larochelle, S. (2023), Geodetic insights into water-driven aquifer and ice sheet dynamics. *AGU Early Career Geodesy Lecture Series*, Online.

Larochelle, S. (2022), Crustal deformation and fault slip due to water injections and extraction. *MPG/SGT Seminar*, Lamont-Doherty Earth Observatory, Columbia University

Larochelle, S. (2022), Crustal deformation and fault slip due to water injections and extraction. *UCLA Geophysics Seminar*, University of California Los Angeles.

Larochelle, S. (2022), Crustal deformation and fault slip due to water injections and extraction. *Institute for Geophysics and Planetary Physics (IGPP) Seminar*, University of California Santa Cruz.

Larochelle, S. (2019), Spatiotemporal Characterization of seasonal crustal deformation due to hydrological processes. *Café des Géosciences Seminar*, École Normale Supérieure (ENS) Paris.

Conferences & workshops:

Larochelle, S., Chanard, K., Fleitout, L., Fortin, J., Longuevergne, L., Argus, D. and Avouac, J.-P. (2021), Extracting and separating different sources of hydrology-induced deformation in geodetic datasets. *AGU Fall Meeting* [Session G51A: Hydrogeodesy: Space Geodetic Applications for Hydrology].

Larochelle, S. (2021), Fluid-induced slip and earthquake nucleation on a rate-and-state fault. *SCEC Workshop on Advancing Simulations of Sequences of Earthquakes and Aseismic Slip*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2021), Constraining the stability of a rate-and-state fault subjected to fluid injection. *Seismological Society of America Annual Meeting* [Session 6452: Mechanisms of Induced Seismicity: Pressure Diffusion, Elastic Stressing and Aseismic Slip].

Larochelle, S. and Avouac, J.-P. (2021), Monitoring of continental water storage from GNSS and GRACE observations. *Saudi Water Forum*, Online.

Larochelle, S. (2020), Numerical modeling of fluid-induced slip on a rate-and-state fault motivated by a field experiment. *11th James K. Knowles Lectures & Caltech Solid Mechanics Symposium*.

Larochelle, S., Gualandi, A., Chanard, K., and Avouac, J.-P. (2019), Spatiotemporal characterization of seasonal crustal deformation due to hydrological processes. *AGU Fall Meeting* [Session U12C: Outstanding Student Presentation Award Winners from Fall Meeting 2018].

Other Presentations

Larochelle, S., Stevens, L. A., Nettles, M., Kingslake, J., Lu, G., Lau, N., Behn, M. D., Fan, W., Das, S. B. (2023), Synchronous, hydro-fracture-driven drainages of neighboring supraglacial lakes and their impact on ice flow. Talk to be presented at *West Antarctica Ice Sheet (WAIS) Workshop*.

Alghannam, M., Lapusta, N., Larochelle, S., Rubino, V., Sirorattanakul, K., Lattanzi, A., Rosakis, A. (2023). Dependence of rupture nucleation and propagation on fluid injection rate: effective stress vs. variations in friction properties. Poster to be presented at *SCEC Annual Meeting*.

Larochelle, S., Stevens, L. A., Nettles, M., Kingslake, J., Lu, G., Lau, N., Behn, M. D., Fan, W., Das, S. B. (2023), Spatiotemporal evolution of englacial stress during synchronous, hydro-fracture-driven drainages of neighboring supraglacial lakes. Abstract submitted to *AGU Fall Meeting*.

Alghannam, M., Larochelle, S., Lapusta, N., Rubino, V., Sirorattanakul, K., Rosakis, A., Lattanzi, A. (2023). Dependence of rupture nucleation and propagation on fluid injection rate: effective stress vs. variations in friction properties. Abstract submitted to *AGU Fall Meeting*.

Lu, G., Kingslake, J., Nettles, M., Stevens, L. A., Larochelle, S. (2023), Observation of supraglacial lake drainages using Autonomous phase-sensitive Radio Echo Sounders (ApRES). Abstract submitted to *AGU Fall Meeting*.

Lau, N., Behn, M. D., Fan, W., Das, S. B., McGuire, J. J., Larochelle, S., Stevens, L. A., Nettles, M., Kingslake, J. (2023), Development of an Efficient Subglacial Meltwater System in Response to Rapid Drainage of Greenland Supraglacial Lakes Inferred from Surface Deformation. Abstract submitted to *AGU Fall Meet*.

Larochelle, S., Chanard, K., Dalaison, M., Fleitout, L., Fortin, J., Longuevergne, L., Argus, D., Jolivet, R., and Avouac J.-P. (2022), Monitoring and modeling of the Sacramento Valley aquifer (California) using geodetic and piezometric measurements. *AGU Fall Meeting* [Talk cancelled due to injury].

Larochelle, S., Chanard, K., Fleitout, L., Gualandi, A., Fortin, J., Rebischung, P., Violette, S., and Avouac, J.-P. (2020), Understanding the geodetic signature of large aquifer systems: Example of the Ozark Plateaus in Central United States. Talk presented at *AGU Fall Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2020), What can fluid-injection field experiments tell us about fault stability? Poster presented at *AGU Fall Meeting*.

Michel, S., Jolivet, R., Lengliné, O., Gualandi, A., Larochelle, S., and Gardonio, B. (2020), Twelve years of seismic and aseismic slip along the San Andreas Fault near Parkfield. Talk presented at *AGU Fall Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2020), Slip response to fluid depressurization constrains fault friction. Poster presented at *SCEC Annual Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2019), Numerical Modeling of Fluid-Induced Slip on Rate-and-State Faults Motivated by a Field Experiment. Poster presented at *AGU Fall Meeting*.

Larochelle, S., Chanard, K., Gualandi, A., and Avouac, J.-P. (2019), Regional fluctuations in hydrological mass inferred from GNSS and GRACE observations. Talk presented at *AGU Fall Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2019), Numerical modeling of fluid-induced slip on a rate-and-state fault motivated by a field experiment. Talk presented at *GeoProc2019*, Utrecht, Netherlands.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2019), Numerical modeling of fluid-induced slip on a rate-and-state fault motivated by a field experiment. Poster presented at *Symposium on The Applications of Mechanics to Geophysics*, University of California San Diego.

Larochelle, S., Gualandi, A., Chanard, K., and Avouac, J.-P. (2018), Identification and extraction of seasonal geodetic signals due to surface load variations. Poster presented at *AGU Fall Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2018), Numerical modeling of a fluid-induced aseismic-seismic slip sequence on a rate-and-state fault. Poster presented at *SCEC Annual Meeting*.

Larochelle, S., Lapusta, N., Ampuero, J.-P., and Cappa, F. (2018), Numerical modeling of a fluid-induced aseismic-seismic slip sequence on a rate-and-state fault. Poster presented at *NSF Workshop on Modeling Earthquake Source Processes*, Pasadena, California.

Larochelle, S., Chanard, K., Gualandi, A., and Avouac, J.-P. (2017), Seasonal geodetic strain in the Himalaya: Extraction, modeling & correlation with seismicity. Poster presented at *AGU Fall Meeting*.

Larochelle, S., Lapusta, N., and Ampuero J.-P. (2017), Numerical modeling of fluid-induced seismic and aseismic fault slip. Poster presented at *Cargèse Earthquakes School*, Corsica, France.

Liu, Y., Harrington, R., Deng, K. and Larochelle, S. (2015), Modeling aseismic and seismic slip induced by fluid injection on pre-existing faults governed by rate-and-state friction. Talk presented at *AGU Fall Meeting*.

Larochelle, S., Selvadurai, A.P.S., and Cao, C. (2015), Fluid flow through a fracture in a Cobourg limestone sample. Poster presented at *McGill SURE Poster Presentation*.

Larochelle, S., Pietkowicz, R., and Mitchell, D. (2014), Simulated earthquake testing of concrete frame structures. Poster presented at *McGill SURE Poster Presentation*.