

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: Meredith Nettles, Jonathan Kingslake, 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> 2. <i>Fluid flow through fractured and intact limestone</i> 3. <i>Seismic performance of concrete frame structure</i> Advisors: 1. Yajing Liu, 2. Patrick Selvadurai, 3. Denis Mitchell	Fall 2015 Summer 2015 Summer 2014

Publications **In preparation:**

Larochelle, S., Stevens, L. A., Nettles, M., Lu, G., Lau, N., Behn, M. D., Fan, W., Das, S. B., Inter-lake triggering of supraglacial lake drainages. In preparation.

Larochelle, S., Ampuero, J.-P., Lapusta, N., & Lambert, V., Fluid-induced slip and earthquake nucleation on aging rate-and-state faults. In preparation.

Submitted:

Larochelle, S., Chanard, K., Dalaison, M., Fortin, J., Longuevergne, L., Fleitout, L., Argus, D. F., Gauer, L.-M., Jolivet, R., & Avouac, J.-P., Imaging the abrupt collapse of California's Sacramento Valley due to drought-driven groundwater extraction. In revision for resubmission.

Alghannam, M., Larochelle, S., Lapusta, N., Rubino, V., Sirorattanakul, K., Lattanzi, A., & Rosakis, A., Reproducing the lab-observed dependence of rupture nucleation on fluid pressurization rate in rate-and-state simulations. In revision for *Philosophical Transactions A*.

Sirorattanakul, K., Larochelle, S., Rubino, V., Rosakis, A. J., & Lapusta, N., Sliding and healing of frictional interfaces that appear stationary. In review at *Nature*.

Stevens, L. A., Das, S. B., Behn, M. D., McGuire, J. J., Lai, C.-Y., Joughin, I., Larochelle, S., & Nettles, M., Elastic stress coupling between supraglacial lakes. In press at *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)
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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	AGU Outstanding Reviewer for <i>JGR: Solid Earth</i>	2023
	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)	Summer
	Maintenance and recovery of on-ice GNSS, ice-penetrating radar, and water pressure instruments.	2023
	Helicopter field survey of hydro-fracture features.	

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>	2020
	Caltech ME/Ge/Ae 266 - <i>Dynamic Fracture & Frictional Faulting</i>	2020
	Caltech Ge 162 - <i>Introduction to Seismology</i>	2019
	Caltech Ge/ESE 118 - <i>Introduction to Data Analysis</i>	2018
	Caltech Ge 1 - <i>Introduction to Earth Sciences</i>	2018
	McGill CIVE 210 - <i>Surveying</i> (field class)	2016
	McGill FACC 300 - <i>Engineering Economy</i>	2015-16

Service	Professional:	
	Session co-convener (G006), AGU Fall Meeting	2023
	Early career representative of AGU Geodesy Section	2022-
	Student representative of AGU Geodesy Section	2021-22
	Organizing Committee of MESP Workshop	2018
	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>	2018-
	University:	
	MPG/SGT (Geophysics) Seminar Organizing Committee, LDEO	2023-
	Postdocs Social Planning Committee, LDEO	2023-
	GPS Local Student Committee, Caltech	2019-20
	Seismo Lab Seminars Organizing Committee, Caltech	2018-19
	Women in GPS (WinGs) Treasurer, Caltech	2018-20
	Graduate Student Council Board of Directors, Caltech	2017-19
	Graduate Student Council Social Committee, Caltech	2016-19

Community:

Lamont-Doherty Earth Observatory Open House	2022
Graphic designer for Pasadena Tenant Union	2022
Caltech Y tutoring for Pasadena high schools	2021
Caltech GPS Future Ignited mentoring program	2020
Caltech HerStories organizing committee [cancelled due to covid]	2019-20

Invited Talks

Seminars:

Larochelle, S. (2024), Geophysics of the changing hydro-cryosphere: From California's aquifers to Greenland's supraglacial lakes. Department of Earth, Planetary & Space Sciences, University of California Los Angeles.

Larochelle, S. (2024), Mechanics of the changing hydro-cryosphere: From California's aquifers to Greenland's supraglacial lakes. Department of Earth & Environmental Sciences, Syracuse University.

Larochelle, S. (2023), Geodetic insights into the mechanics of supraglacial lakes. *EGU Geodesy Campfire*, Online.

Larochelle, S. (2023), Englacial stresses and strains due to supraglacial lake drainages. *Mathematics on Ice Forum Seminar Series*, Online.

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*.

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*.

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*.

Other Presentations

Larochelle, S., Stevens, L. A., Nettles, M., 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. Talk presented at *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. Poster presented at *AGU Fall Meeting*.

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

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

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 presented at *West Antarctica Ice Sheet (WAIS) Workshop*.

Kingslake, J., Case, E., Hoffman, A., Austermann, J., Christianson, K., Cordero, I., Ely, J., Livingstone, S., Larochelle, S., Nettles M., Sole, A., Stevens L., Winberry, P., Winter, K., and the GHOST team. (2023), Phase-sensitive radar measurements of englacial strain rates in diverse glacial settings. Talk 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 presented at *SCEC Annual Meeting*.

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].

Argus, D., Martens, H., Borsa, A., Wiese, D., Knappe, E., Larochelle, S., Anderson, M., Peidou, A., Khatiwada, A., Lau, N., White, A., Hoylman, Z., Swarr, M., Cao, Q., Pan, M., Chanard, K., Avouac, J.-P., Payton, G., Landerer, F. (2022), Intensifying hydrologic drought in California. Talk Presented at the *EGU General Assembly*.

Argus, D., Martens, H., Wiese, D., Borsa, A., Knappe, E., Larochelle, S., Avouac, J.-P., Chanard, K., Anderson, M., Peidou, A., White, A., Khatiwada, A., Landerer, F., (2021), Loss of water in the ground in the southwest US during drought in 2020 and 2021. Talk Presented at the *AGU Fall Meeting*.

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*.