

Paul A Selvadurai

CONTACT	ETH Zürich	Phone: +41 44 633 67 73
INFORMATION	Swiss Seismological Service	E-mail: paul.selvadurai@sed.ethz.ch
	Department of Earth Sciences	ORCID ID: 0000-0002-3846-8333
	8092 Zürich, Switzerland	Scopus ID: 23973552000
		Google Scholar h-index: 13

Publications in Peer-Reviewed Scientific Journals

- [1] **Selvadurai, P.A.**, Wu, R., Bianchi, P. et al. (2022) "A Methodology for Reconstructing Source Properties of a Conical Piezoelectric Actuator Using Array-Based Methods." *Journal of Nondestructive Evaluation* 41, 23. <https://doi.org/10.1007/s10921-022-00853-6>
- [2] Gräff, D., Köpfl, M., Lipovsky, B. P., **Selvadurai, P. A.**, Farinotti, D., & Walter, F. (2021). Fine structure of microseismic glacial stickslip. *Geophysical Research Letters*, 48, e2021GL096043. <https://doi.org/10.1029/2021GL096043>
- [3] Wu, R., **Selvadurai, P.A.**, Chen, C. et al. (2021) "Revisiting Piezoelectric Sensor Calibration Methods Using Elastodynamic Body Waves." *Journal of Nondestructive Evaluation* 40, 68. <https://doi.org/10.1007/s10921-021-00799-1>
- [4] Passarelli, L. **Selvadurai, P.A.**, Rivalta, E. and Sigurjón, J. (2021) "The source scaling and seismic productivity of slow slip transients", *Science Advances*, 7(32) DOI: 10.1126/sciadv.abg9718
- [5] Villiger, L., Gischig, V.S., Doetsch, J., Krietsch, H., Dutler, N., Jalali, M., Valley, B., **Selvadurai, P.A.**, Mignan, A., Plenkers, K., Giardini, D., Amann, F. and Wiemer, S. (2020), "Influence of reservoir geology on seismic response during decameter scale hydraulic stimulations in crystalline rock", *Solid Earth*, 11, 627–655, <https://doi.org/10.5194/se-11-627-2020>, 2020.
- [6] Selvadurai, A.P.S., Blain-Coallier, A. and **Selvadurai, P.A.** (2020) "Estimates for the Effective Permeability of Intact Granite Obtained from the Eastern and Western Flanks of the Canadian Shield" *Minerals* 10, no. 8: 667. <https://doi.org/10.3390/min10080667>
- [7] **Selvadurai, P.A.** (2019), "Laboratory insight into seismic estimates of energy partitioning during dynamic rupture: An observable scaling breakdown", submitted to *Journal of Geophysical Research: Solid Earth*, 124 doi:10.1029/2018JB017194.
- [8] Selvadurai, A.P.S., **Selvadurai, P.A.** and Nejati, M. (2019), "NA Multi-phasic Approach for Estimating the Biot Coefficient for Grimsel Granite", accepted in *Solid Earth*, <https://doi.org/10.5194/se-2019-82>.
- [9] Selvadurai, A.P.S., **Selvadurai, P.A.** and Suvorov, A. (2018), "Contact mechanics of a dilatant region located at a compressed elastic interface", *International Journal of Engineering Science*, 133, pp. 144–168.
- [10] **Selvadurai, P.A.**, Parker, J.M. and Glaser, S.D. (2017a), "Numerical Modeling Describing the Effects of Heterogeneous Distributions of Asperities on the Quasi-static Evolution of Frictional Slip", *Rock Mechanics and Rock Engineering*, <https://doi.org/10.1007/s00603-017-1333-9>.
- [11] **Selvadurai, P.A.**, Parker, J.M. and Glaser, S.D. (2017), "On factors controlling precursor slip fronts in the laboratory and their relation to slow slip events in nature", *Geophysical Research Letters*, 44, doi:10.1002/2017GL072538.
- [12] Saltiel, S., **Selvadurai, P.A.**, Bonner, B.P., Glaser, S.D. and Ajo-Franklin, J.B. (2017), "Experimental development of low-frequency shear modulus and attenuation measurements in mated rock fractures: Shear mechanics due to asperity contact area changes with normal stress", *Geophysics*, 82(2) P. M19–M36, 10.1190/GEO2016-0199.1. [Awarded the Honorable Mention Best Paper Prize].
- [13] **Selvadurai, P.A.** and Glaser, S.D. (2017), "Asperity generation and its relationship to seismicity on a planar fault: a laboratory simulation", *Geophysical Journal International*, DOI: 10.1093/gji/ggw439.

- [14] **Selvadurai, P.A.** and Glaser, S.D. (2015a), "Characteristics of asperity breakdown along a failing frictional interface using optical-acoustic techniques", *Sensors*, 15, 9791-9814.
- [15] **Selvadurai, P.A.** and Glaser, S.D. (2015), "Laboratory-developed contact models controlling instability on frictional faults", *Journal of Geophysical Research: Solid Earth*, 120.
- [16] Selvadurai, A.P.S., Suvorov, A.P. and **Selvadurai, P.A.** (2015), "Thermo-hydro-mechanical processes in fractured rock formations during glacial advance", *Geoscientific Model Development*, 7, 7351-7394.
- [17] **Selvadurai, P.A.** and Selvadurai, A.P.S. (2014), "On the effective permeability of a heterogeneous porous medium: the role of the geometric mean", *Philosophical Magazine*, 94, 2318-2338.
- [18] Selvadurai, A.P.S. and **Selvadurai, P.A.** (2011), "Historical Notes: A Momentary Lapse in Concentration by the Genius?", *Mathematics Today*, 47, 244-245.
- [19] Selvadurai, A.P.S. and **Selvadurai, P.A.** (2010), "Surface permeability tests: Experiments and modeling for estimating effective permeability", *Proceedings of the Royal Society A*, 466(2122), 2819–2846 [Awarded the IACMAG 2011 Best Paper Prize].
- [20] **Selvadurai, P.A.** and Selvadurai, A.P.S. (2007), "On cavity flow permeability testing of a Sandstone," *Groundwater*, 45(1) 93-97.

Peer-reviewed Conference Proceedings

- [21] Bianchi, P., **Selvadurai, P.A.**, Salazar, A., Dal Zilio, L., Gerya, T., Madonna, C., Wiemer, S. (2022) "A Study of Progressive Failure in Porous Rocks Using Numerical and Experimental Modeling" Paper presented at *the 56th U.S. Rock Mechanics/Geomechanics Symposium*, Santa Fe, NM, USA, June 2022.
- [22] Salazar V.A., **Selvadurai, P.A.**, Niu, Z., Bianchi, P., Rabaiotti, C., Madonna, C., Wiemer, S. and Germanovich, L.N. (2022) "Insights into triaxial testing using coupled acoustic emission and distributed optical fiber strain measurements" Paper presented at *the 56th U.S. Rock Mechanics/Geomechanics Symposium*, Santa Fe, NM, USA, June 2022.
- [23] Wu, R., **Selvadurai, P.A.**, Chen, C. J., and O. Moradian. (2020) "A FEM-Based Methodology to Acquire Broadband Empirical Green's Functions to Understand Characterization Tests of Acoustic Emission Sensors." Paper presented at *the 54th U.S. Rock Mechanics/Geomechanics Symposium*, physical event cancelled, June 2020.
- [24] Tsui, K., Seward, A., Siddiqi, G., Boyd, L., Feitz, A., Johannesson, G. Flovenz, O., Beardsmore, G., Pettitt, W., Orozco, G., Meier, P., **Selvadurai, P.A.**, Wiemer, S. and Podgorney, R. (2020), International partnership for geothermal technology (IPGT), in *Proceedings World Geothermal Congress 2020*, Reykjavik, Iceland.
- [25] **Selvadurai, P.A.**, Parker, J.M. and Glaser, S.D. (2016), "Numerical modeling of heterogeneous asperity distributions controlling the growth of shear rupture on a frictional fault", in *50th US Rock Mechanics | Geomechanics Symposium*, June 2016, Houston, TX, USA.
- [26] **Selvadurai, P.A.** and Glaser, S.D. (2014), "Insights into dynamic asperity failure in the laboratory", in *48th US Rock Mechanics | Geomechanics Symposium*, June 2014, Minneapolis, MN, USA.
- [27] **Selvadurai, P.A.** and Glaser, S.D. (2013), "Experimental evidence of micromechanical processes that control localization of shear rupture nucleation", in *47th US Rock Mechanics | Geomechanics Symposium*, June 2013, San Francisco, CA, USA.
- [28] **Selvadurai, P.A.** and Glaser, S.D. (2012), "Direct measurement of contact area and seismic stress along a sliding interface", in *46th US Rock Mechanics | Geomechanics Symposium*, June 2012, Chicago, IL, USA.
- [29] Selvadurai, A.P.S. and **Selvadurai, P.A.** (2011), "Recent advances in modeling techniques for estimating permeability of anisotropic and inhomogeneous geomaterials", in *13th International Conference of the International Association for Computer Methods and Advances in Geomechanics*, 221-230.

- [30] Selvadurai, A.P.S. and **Selvadurai, P.A.** (2010), "The role of modelling and simulations in estimating multiscale effective permeability", R. I. Borja, E. M. Dunham, E. Kuhl and J. A. White, eds, in *International Workshop on Multiscale and Multiphysics Processes in Geomechanics*, Stanford University, Palo Alto, CA, USA.

Invited Lectures or Contributions

- Selvadurai, P.A.** (2019), *Invited talk*: "Seismologic estimates of energy flow during dynamic rupture: Benefits of laboratory settings to understand up-scaling processes", *American Geophysical Union (AGU) Fall Meeting*, San Francisco, CA.
- Selvadurai, P.A.** (2019) "Investigations into the variety of frictional behaviors produced between worn PMMA interfaces", *Keynote lecture in Geophysical Colloquium*, Kaust, Thulwal, Kingdom of Saudi Arabia.
- Selvadurai, P.A.** (2019) "Investigations into the variety of frictional behaviors produced between worn PMMA interfaces", *Keynote speaker in the Workshop on rock friction, non-linear physics and slow earthquakes*, Fukuoka, Japan.
- Selvadurai, P.A.**, Glavez, P., Wiemer, S. and Mai, P. M. (2019), *Invited talk*: "Modelling precursory seismicity in the laboratory using a roughness derived RS friction model", *Japanese Geoscience Union Meeting 2019*, SCG48-33, Chiba, Japan.
- Selvadurai P.A.**, Edward, B., Tormann, T., Wiemer, S. and Glaser, S.D. (2018), *Invited talk*: "Roughness-induced rupture barriers constraining the size of spontaneous seismicity on frictional interfaces in the laboratory", *American Geophysical Union (AGU) Fall Meeting*, Washington, DC.
- Selvadurai, P.A.** (2017) "Caprock Defects and their Influences on Secure Geologic Sequestration of CO₂", *invited talk presented on behalf of A.P.S. Selvadurai in the 15th International Conference of the International Association for Computer Methods and Advances in Geomechanics*, Wuhan, China October 21, 2017.
- Selvadurai, P.A.** (2017) "A laboratory study in the characteristics of seismicity on worn faults", *invited ETH Geophysical Colloquium HS2017 Seminar Series*, ETH Zurich, Zurich, Switzerland, October 13, 2017.
- Selvadurai, P.A.** (2017) "Visual evolution of asperity contact area during the passage of slow shear ruptures in the laboratory", *invited Cargese Summer School*, Cargese, France, October 3, 2017.
- Selvadurai, P.A.** (2016) "Laboratory investigation into foreshock sequences and their relation to nucleation processes on a frictional fault", *invited AEED Seminar Series*, Lawrence Livermore National Laboratory, Livermore, USA, August 23, 2016.
- Selvadurai, P.A.** (2016) "Numerical modeling of heterogeneous asperity distributions controlling the growth of shear rupture on a frictional fault", *invited EPFL Memento*, Lausanne, Switzerland, July 13, 2016.
- Selvadurai, P.A.** (2016) "Laboratory investigation into foreshock sequences and their relation to nucleation processes on a frictional fault", *invited Seismological seminar series*, ETH Zurich, Switzerland, July 12, 2016.
- Selvadurai, P.A.** (2016) "Laboratory investigation into foreshock sequences and their relation to nucleation processes on a frictional fault", *invited Geophysics seminar*, Lawrence Berkeley National Laboratory, Berkeley, USA, June 12, 2016.
- Selvadurai, P.A.** (2015) "Laboratory-developed contact models controlling instability on frictional faults", *invited Berkeley Seismological Laboratory Seminar*, University of California, Berkeley, USA, March 3, 2015.

Selvadurai, P.A. (2014) "Laboratory Earthquakes: Glimpses Into Precursory Phenomena", *invited Research Seminar in Applied Mechanics*, McGill University, Montreal, December 23, 2014.

Selvadurai, P.A. (2013) "Direct measurement of contact area and seismic stress along a sliding interface", *invited Research Seminar in Applied Mechanics*, McGill University, Montreal, August 28, 2013.

Selvadurai, P.A. (2012) "Laboratory Investigations into Micromechanical Mechanisms Controlling the Onset of Stick-Slip Instabilities", *invited Geomechanics Research Symposium*, McGill University, Montreal, March 3, 2012.

Submitted to Peer-Reviewed Scientific Journals

Selvadurai, P.A., Galvez, P., Mai, P. M., (TBD) "Modeling precursory laboratory seismicity using a wear-based rate- and state-dependent friction model" *Submitted to Tectonophysics*.

Wu, R., Selvadurai, P.A., Li, Y., Sun, Y., Leith, K., Loew, K. (TBD) "Laboratory acousto-mechanical study into moisture-induced changes of elastic properties in intact granite" *Submitted to Journal of Geophysical Research: Solid Earth*

Oral Contributions to Conferences (Posters or Talks)

Selvadurai, P.A., Galvez, P., Peter, D. and Mai, P. M. (2019), Poster presentation: "B03: Earthquake Rupture Modelling of a Rough Fault in Laboratory Experiments", *Numerical Modeling of Earthquake Motions: Waves and Ruptures Workshop*, B03, Bratislava, Slovakia.

Selvadurai, P.A. (2019), Poster presentation: "Seismologic estimates of energy flow during dynamic rupture: Benefits of laboratory settings to understand up-scaling processes", *in European Geosciences Union (EGU) General Assembly*, EGU2019-17431, Vienna, Austria.

Galvez, P., **Selvadurai, P.A.**, Edwards, B., Tormann, T., Wiemer, S., and Glaser, S.D. (2019), Poster presentation: "Worn fault surfaces and foreshocks: Modelling observed precursory seismicity in the laboratory with rate and state friction", *in European Geosciences Union (EGU) General Assembly*, EGU2019-17020, Vienna, Austria.

Selvadurai P.A. (2018), Oral presentation: "Laboratory study into frictional precursory source dimensions and their relationship to length-scale dependent fault roughness", *36th General Assembly of the European Seismological Commission*, ESC2018-S24-308, Valletta, Malta.

L Villiger, **P.A. Selvadurai**, V Gischtig, J Doetsch, H Krietsch, N Dutler, (2018), Poster presentation: "On the variability of the seismic response during multiple decameter-scale hydraulic stimulations", *in European Geosciences Union (EGU) General Assembly*, Vienna, Austria.

Selvadurai, P.A., Tormann, T., Wiemer, S. and Glaser, S.D. (2017), Oral presentation: "Direct measurements of asperity evolution in the laboratory relating to fault reactivation in stimulated reservoirs", *in the 2nd Induced Seismicity Workshop*, March, Davos, Switzerland.

Selvadurai, P.A., Glaser, S.D. and Parker, J.M. (2015), Poster presentation: "S31A-2708 Variations in slow slip evolution caused by strength heterogeneity along laboratory faults", *in AGU Fall Meeting*, December, San Francisco, CA, USA.

Saltiel, S., Bonner, B.P., Ajo-Franklin, J.B. and **Selvadurai, P.A.** (2015), Poster presentation: "H51M-1570: Low-frequency shear measurements on fractured samples to determine detectability of fractures at various stress conditions," *in AGU Fall Meeting*, December, San Francisco, CA, USA.

Parker, J.M., **Selvadurai, P.A.** and Glaser, S.D. (2015), Poster presentation: "S31A-2710: 'Burst-Like' Slow Slip Propagation on Frictional Faults in the Laboratory", *in AGU Fall Meeting*, December, San Francisco, CA, USA.

Selvadurai, P.A. and Glaser, S.D. (2015), Oral presentation: "35327 Slow slip processes on frictional faults; simulations in a laboratory setting", *in AGU Joint Assembly*, May, Montreal, QC, CAN.

Selvadurai, A.P.S. and **Selvadurai, P.A.** (2015), "EGU2015-2237-1: The geometric mean concept for interpreting the permeability of heterogeneous geomaterials", in *EGU General Assembly*, April, Vienna, Austria.

Selvadurai, P.A. and Glaser, S.D. (2014), Poster presentation: "S23B-4498: Laboratory investigation into foreshock sequences and their relation to nucleation processes on a frictional fault", in *AGU Fall Meeting*, December, San Francisco, CA, USA.

Selvadurai, P.A. and Glaser, S.D. (2013), Oral presentation: "1804870 Laboratory investigations into micromechanical mechanism controlling earthquake nucleation", in *AGU Fall Meeting*, December, San Francisco, CA, USA [Awarded AGU Outstanding Student Paper Award in Seismology].

Selvadurai, P.A. and Selvadurai, A.P.S. (2011), Poster presentation: "1175092 Influence of Geomaterial Heterogeneity on the Results of Hydraulic Pulse Tests", in *AGU Fall Meeting*, December, San Francisco, CA, USA.

Selvadurai, A.P.S. and **Selvadurai, P.A.** (2009), Oral presentation: "On the surface permeability of Indiana Limestone," M. Diederichs and G. Grasselli, eds., in *Proceedings of the 3rd Can-US Rock Mechanics Symposium*, Toronto, ON, CAN

Selvadurai, P.A. and Selvadurai, A.P.S. (2009), Poster presentation: "700356 A large block experiment for measurement of the effective permeability of Indiana limestone", in *AGU Fall Meeting*, December, San Francisco, CA, USA.

Technical Reports:

Selvadurai, A.P.S., Suvorov, A.P. and **Selvadurai, P.A.** (2014), Application of the COMSOL multi-physics code for coupled thermo-hydro-mechanical modeling of fractured rock mass subjected to glaciation load, *Technical Report Nuclear Waste Management Organization*, ON, Canada, TGS-XXX.

Selvadurai, P.A., Glaser, S.D. and Kiwan, R.H. (2013), "Laboratory Investigations into Micromechanical Mechanisms Controlling the Onset of Stick-slip Instabilities," *Berkeley Seismological Laboratory Annual Report*, 50-51.

Dissertations from Academic Institutions

Selvadurai, P.A. (2010), "Permeability of Indiana Limestone: Experiments and Theoretical Concepts for Interpretation of Results", *Master's Thesis at the Department of Civil Engineering and Applied Mechanics at McGill University*, Montreal, Quebec, Canada, H3A 2K6. pp. 108.

Selvadurai, P.A. (2015), "Laboratory studies of frictional sliding and the implications of precursory seismicity", *Doctoral dissertation at Civil and Environmental Engineering at University of California*, Berkeley, Berkeley, CA, USA. pp. 138.