Stanford



Jenny Suckale

Associate Professor of Geophysics and Senior Fellow, by courtesy, at the Woods Institute for the Environment

Curriculum Vitae available Online

Bio

BIO

My research group studies disasters to reduce the risk they pose. We approach this challenge by developing customized mathematical models that can be tested against observational data and are informed by community needs through a scientific co-production process. We intentionally work on extremes across different natural systems rather than focusing on one specific natural system to identify both commonalities in the physical processes driving extremes and in the best practices for mitigating risk at the community level. Our current research priorities include volcanic eruptions, ice-sheet instability, permafrost disintegration, induced seismicity and flood-risk mitigation. I was recently awarded the Presidential Early Career Awards for Scientists and Engineers, the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers and the CAREER award from the National Science Foundation.

ACADEMIC APPOINTMENTS

- Associate Professor, Geophysics
- Senior Fellow (By courtesy), Stanford Woods Institute for the Environment
- Faculty Affiliate, Institute for Human-Centered Artificial Intelligence (HAI)
- Member, Institute for Computational and Mathematical Engineering (ICME)
- Center Fellow, by Courtesy, Stanford Woods Institute for the Environment

ADMINISTRATIVE APPOINTMENTS

- Research Fellow, Seismic Hazards, GeoForschungsZentrum (GFZ), Potsdam, Germany, (2003-2004)
- Research Fellow, Seismic Hazards, Institute de Recherche pour le Developpement (IRD), Nice, France, (2003-2003)
- Scientific Consultant, Communities at Risk Program, South Pacic Applied Geoscience Commission, Suva, Fiji Islands, (2003-2003)
- Research Assistant, GeoForschungsZentrum (GFZ), Potsdam, Germany,, (2002-2002)
- Freelancer, German National Commission for UNESCO, Berlin, Germany, (2001-2002)
- Consultant, South African National Commission for UNESCO, Pretoria, South Africa, (2000-2000)

HONORS AND AWARDS

- Miller Research Fellowship (declined), University of California, Berkeley (2010)
- Ziff Environmental Fellow, Harvard Center for the Environment (2010)
- Graduate Student Research Grant, Geological Society of America (2009)
- Outstanding Student Paper Award, American Geophysical Union, Fall Meeting (2008)
- Graduate Student Research Grant, Massachusetts Institute of Technology (2007 and 2009)

- Presidential Fellow, Massachusetts Institute of Technology (2006-2007)
- McCloy Scholar (comparable to the Rhodes Scholarship. Granted nationwide to six students per year.), German National Merit Foundation (2004-2005)
- Scholarship, Robert Bosch and German National Merit Foundation (2002-2003)
- Scholarship, German National Merit Foundation (1997-2002)

PROFESSIONAL EDUCATION

- Ph.D, Massachusetts Institute of Technology , Geophysics (2011)
- MPA, Harvard University, Kennedy School of Government , Master of Public Administration (2006)
- M.Sc., Free University Berlin, Germany , Physics (with Distinction) (2002)

LINKS

- Research Group, SIGMA: https://pangea.stanford.edu/researchgroups/sigma/

Research & Scholarship

PROJECTS

- Contributing towards reducing tsunami risk in Indonesia - Stanford University, SIGMA group

Teaching

COURSES

2026-27

- GEOPHYSICAL MULTI-PHASE FLOWS: GEOPHYS 385W (Aut, Spr)

2025-26

- GEOPHYSICAL MULTI-PHASE FLOWS: GEOPHYS 385W (Aut, Win, Spr)
- Physics of Ice: GEOPHYS 133, GEOPHYS 233 (Spr)
- Research Approaches for Environmental Problem Solving: ENVRES 330 (Spr)
- Senior Seminar: Issues in Geophysics: GEOPHYS 199 (Win)

2024-25

- GEOPHYSICAL MULTI-PHASE FLOWS: GEOPHYS 385W (Aut, Win, Spr, Sum)
- Modeling Earth: GEOPHYS 128, GEOPHYS 228 (Win)
- Physics of Ice: GEOPHYS 133, GEOPHYS 233 (Win)

2023-24

- GEOPHYSICAL MULTI-PHASE FLOWS: GEOPHYS 385W (Aut, Win, Spr, Sum)
- Introduction to the Foundations of Contemporary Geophysics: EARTHSYS 110, GEOPHYS 110, GEOPHYS 215 (Win)
- Modeling Earth: GEOPHYS 128, GEOPHYS 228 (Win)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Ron Maor

Doctoral Dissertation Advisor (AC)

Ruth Gale, Zhengyang Wei

Doctoral Dissertation Co-Advisor (AC)

Hannah Melville-Rea, Jayson Toweh

Publications

PUBLICATIONS

- **Late Holocene stabilization of Conway Ice Ridge** *CRYOSPHERE*
  Hoffman, A. O., Summers, P. T., Suckale, J., Christianson, K., Catania, G., Conway, H.
  2026; 20 (7): 3977-4003

- **Characterizing Heat Health Outcomes and Informing Public Health Interventions with Medical Claims Data in California.** *Environmental science & technology*
  Bick, I. A., Hervey, G., Suckale, J.
  2026

- **Drawing the line: how levee accreditation shapes flood insurance winners and losers** *ENVIRONMENTAL RESEARCH LETTERS*
  Melville-Rea, H., Bowers, C., Schaefer, K., Suckale, J.
  2026; 21 (1)

- **Shear-Layer Thickness and Structure Evolves With Effective Stress in Subglacial Environments** *GEOPHYSICAL RESEARCH LETTERS*
  Madden, I., Hansen, D. D., Zoet, L. K., Suckale, J.
  2025; 52 (6)

- **Soft matter physics of the ground beneath our feet.** *Soft matter*
  Voigtländer, A., Houssais, M., Bacik, K. A., Bourg, I. C., Burton, J. C., Daniels, K. E., Datta, S. S., Del Gado, E., Deshpande, N. S., Devauchelle, O., Ferdowsi, B., Glade, R., Goehring, et al
  2024

- **Moving from total risk to community-based risk trajectories increases transparency and equity in flood risk mitigation planning along urban rivers** *ENVIRONMENTAL RESEARCH LETTERS*
  Serafin, K. A., Koseff, J. R., Ouyang, D., Suckale, J.
  2024; 19 (6)

- **Integrating water quality data with a Bayesian network model to improve spatial and temporal phosphorus attribution: Application to the Maumee River Basin.** *Journal of environmental management*
  Wei, Z., Alam, S., Verma, M., Hilderbran, M., Wu, Y., Anderson, B., Ho, D. E., Suckale, J.
  2024; 360: 121120

- **Evidence for and Against Temperate Ice in Antarctic Shear Margins From Radar-Depth Sounding Data** *GEOPHYSICAL RESEARCH LETTERS*
  Summers, P. T., Schroeder, D. M., May, D. F., Suckale, J.
  2024; 51 (9)

- **Spontaneous Formation of an Internal Shear Band in Ice Flowing Over Topographically Variable Bedrock** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Liu, E., Raess, L., Herman, F., Podladchikov, Y., Suckale, J.
  2024; 129 (4)

- **Deciphering Clues Regarding Magma Composition Encoded in Quartz-Hosted Embayments and Melt Inclusions Through Direct Numerical Simulations** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Wei, Z., Ruefer, A. C., Pamukcu, A. S., Suckale, J.
  2024; 129 (4)

- **Improving adaptation to wildfire smoke and extreme heat in frontline communities: evidence from a community-engaged pilot study in the San Francisco Bay Area** *ENVIRONMENTAL RESEARCH LETTERS*
  Herbert, N., Beckman, C., Cannedy, C., Cao, J., Cho, S., Fischer, S., Huang, S., Kramer, S. J., Lopez, O., Lopez, S., Ouyang, D., Suckale, J., Wulf-Saena, et al
  2023; 18 (7)

- **Leveraging Google's Tensor Processing Units for tsunami-risk mitigation planning in the Pacific Northwest and beyond** *GEOSCIENTIFIC MODEL DEVELOPMENT*
  Madden, I., Marras, S., Suckale, J.
  2023; 16 (12): 3479-3500
- **The Yih Instability in Layered Lava Flow May Initiate the Pahoehoe to 'a'a Lava Transition** *GEOPHYSICAL RESEARCH LETTERS*
  Culha, C., Spinner, S., Suckale, J.
  2023; 50 (10)
- **Physics-Based Forecasting of Induced Seismicity at Groningen Gas Field, The Netherlands: Post Hoc Evaluation and Forecast Update** *SEISMOLOGICAL RESEARCH LETTERS*
  Dempsey, D. E., Suckale, J.
  2023; 94 (3): 1429-1446
- **Forest density is more effective than tree rigidity at reducing the onshore energy flux of tsunamis** *COASTAL ENGINEERING*
  Mukherjee, A., Cajas, J., Houzeaux, G., Lehmkuhl, O., Suckale, J., Marras, S.
  2023; 182
- **Migration of the Shear Margins at Thwaites Glacier: Dependence on Basal Conditions and Testability Against Field Data** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Summers, P. T., Elsworth, C. W., Dow, C. F., Suckale, J.
  2023; 128 (3)
- **Quantifying the fragility of coral reefs to hurricane impacts: a case study of the Florida Keys and Puerto Rico** *ENVIRONMENTAL RESEARCH LETTERS*
  Madden, I. A., Mariwala, A., Lindhart, M., Narayan, S., Arkema, K. K., Beck, M. W., Baker, J. W., Suckale, J.
  2023; 18 (2)
- **Genetic model of the El Laco magnetite-apatite deposits by extrusion of iron-rich melt.** *Nature communications*
  Keller, T., Tornos, F., Hanchar, J. M., Pietruszka, D. K., Soldati, A., Dingwell, D. B., Suckale, J.
  2022; 13 (1): 6114
- **Safe Shelter: A Case for Prioritizing Housing Quality in Climate Adaptation Policy by Remotely Sensing Roof Tarps in the San Francisco Bay Area** *EARTHS FUTURE*
  Velterop, E., Uzkent, B., Suckale, J.
  2022; 10 (8)
- **Disrupt the upper or the lower conduit? The dual role of gas exsolution in the conduits of persistently active volcanoes** *JOURNAL OF FLUID MECHANICS*
  Peng, S., Picchi, D., Suckale, J.
  2022; 942
- **Biased Witnesses: Crystal Thermal Records May Give Conflicting Accounts of Magma Cooling** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Culha, C., Keller, T., Suckale, J.
  2022; 127 (5)
- **Magma Mixing During Conduit Flow is Reflected in Melt-Inclusion Data From Persistently Degassing Volcanoes** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Wei, Z., Qin, Z., Suckale, J.
  2022; 127 (2)
- **Science Translation During the COVID-19 Pandemic: An Academic-Public Health Partnership to Assess Capacity Limits in California.** *American journal of public health*
  Maldonado, P., Peng, A., Ouyang, D., Suckale, J., Ho, D. E.
  1800; 112 (2): 308-315
- **Shear Variation at the Ice-Till Interface Changes the Spatial Distribution of Till Porosity and Meltwater Drainage** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Kasmalkar, I., Damsgaard, A., Goren, L., Suckale, J.
  2021; 126 (12)

- **Interactions Between Gas Slug Ascent and Exchange Flow in the Conduit of Persistently Active Volcanoes** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Qin, Z., Beckett, F. M., Rust, A. C., Suckale, J.
  2021; 126 (9)
- **Traffic accidents and delays present contrasting pictures of traffic resilience to coastal flooding in the San Francisco Bay Area, USA** *URBAN CLIMATE*
  Kasmalkar, I., Suckale, J.
  2021; 37
- **Rising Seas, Rising Inequity? Communities at Risk in the San Francisco Bay Area and Implications for Adaptation Policy** *Earth's Future*
  Bick, I., Santiago Tate, A. F., Serafin, K. A., Miltenberger, A., Ayansi, I., Evans, M., Ortolano, L., Ouyang, D., Suckale, J.
  2021; 9 (7)
- **Integrating urban traffic models with coastal flood maps to quantify the resilience of traffic systems to episodic coastal flooding.** *MethodsX*
  Kasmalkar, I. G., Serafin, K. A., Suckale, J.
  2021; 8: 101483
- **Water pressure fluctuations control variability in sediment flux and slip dynamics beneath glaciers and ice streams** *COMMUNICATIONS EARTH & ENVIRONMENT*
  Damsgaard, A., Goren, L., Suckale, J.
  2020; 1 (1)
- **Crystal aggregates record the pre-eruptive flow field in the volcanic conduit at Kilauea, Hawaii.** *Science advances*
  DiBenedetto, M., Qin, Z., Suckale, J.
  2020; 6 (49)
- **When floods hit the road: Resilience to flood-related traffic disruption in the San Francisco Bay Area and beyond.** *Science advances*
  Kasmalkar, I. G., Serafin, K. A., Miao, Y., Bick, I. A., Ortolano, L., Ouyang, D., Suckale, J.
  2020; 6 (32): eaba2423
- **The protective benefits of tsunami mitigation parks and ramifications for their strategic design.** *Proceedings of the National Academy of Sciences of the United States of America*
  Lunghino, B., Santiago Tate, A. F., Mazereeuw, M., Muhari, A., Giraldo, F. X., Marras, S., Suckale, J.
  2020
- **Modelling thermomechanical ice deformation using an implicit pseudo-transient method (FastICE v1.0) based on graphical processing units (GPUs)** *GEOSCIENTIFIC MODEL DEVELOPMENT*
  Rass, L., Licul, A., Herman, F., Podladchikov, Y. Y., Suckale, J.
  2020; 13 (3): 955–76
- **Crystal Fractionation by Crystal-Driven Convection** *GEOPHYSICAL RESEARCH LETTERS*
  Culha, C., Suckale, J., Keller, T., Qin, Z.
  2020; 47 (4)
- **Flow-to-Sliding Transition in Crystal-Bearing Magma** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Qin, Z., Suckale, J.
  2020; 125 (2)
- **Direct numerical simulations of viscous suspensions with variably shaped crystals** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Qin, Z., Allison, K., Suckale, J.
  2020; 401
- **Periodic outgassing as a result of unsteady convection in Ray lava lake, Mount Erebus, Antarctica** *EARTH AND PLANETARY SCIENCE LETTERS*
  Birnbaum, J., Keller, T., Suckale, J., Lev, E.
  2020; 530
- **A continuum model of multi-phase reactive transport in igneous systems** *GEOPHYSICAL JOURNAL INTERNATIONAL*
  Keller, T., Suckale, J.

2019; 219 (1): 185–222

- **Spatial heterogeneity in subglacial drainage driven by till erosion** *PROCEEDINGS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
  Kasmalkar, I., Mantelli, E., Suckale, J.
  2019; 475 (2228)
- **Spatial heterogeneity in subglacial drainage driven by till erosion.** *Proceedings. Mathematical, physical, and engineering sciences*
  Kasmalkar, I., Mantelli, E., Suckale, J.
  2019; 475 (2228): 20190259
- **Slug Stability in Flaring Geometries and Ramifications for Lava Lake Degassing** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Qin, Z., Soldati, A., Santana, L., Rust, A. C., Suckale, J., Cashman, K. V.
  2018; 123 (12): 10431–48
- **Bistability of buoyancy-driven exchange flows in vertical tubes** *JOURNAL OF FLUID MECHANICS*
  Suckale, J., Qin, Z., Picchi, D., Keller, T., Battiato, I.
  2018; 850: 525–50
- **Adding a community partner to service learning may elevate learning but not necessarily service** *INTERNATIONAL JOURNAL OF DISASTER RISK REDUCTION*
  Suckale, J., Saiyed, Z., Hilley, G., Alvisyahrin, T., Muhari, A., Zoback, M., Truebe, S.
  2018; 28: 80–87
- **A residual-based shock capturing scheme for the continuous/discontinuous spectral element solution of the 2D shallow water equations** *ADVANCES IN WATER RESOURCES*
  Marras, S., Kopera, M., Constantinescu, E., Suckale, J., Giraldo, F. X.
  2018; 114: 45–63
- **Sediment behavior controls equilibrium width of subglacial channels** *JOURNAL OF GLACIOLOGY*
  Damsgaard, A., Suckale, J., Piotrowski, J. A., Houssais, M., Siegfried, M. R., Fricker, H. A.
  2017; 63 (242): 1034–48
- **Direct numerical simulations of gas-solid-liquid interactions in dilute fluids** *INTERNATIONAL JOURNAL OF MULTIPHASE FLOW*
  Qin, Z., Suckale, J.
  2017; 96: 34–47
- **Physics-based forecasting of induced seismicity at Groningen gas field, the Netherlands** *GEOPHYSICAL RESEARCH LETTERS*
  Dempsey, D., Suckale, J.
  2017; 44 (15): 7773–82
- **Linking social, ecological, and physical science to advance natural and nature-based protection for coastal communities.** *Annals of the New York Academy of Sciences*
  Arkema, K. K., Griffin, R., Maldonado, S., Silver, J., Suckale, J., Guerry, A. D.
  2017
- **Flow-to-fracture transition in a volcanic mush plug may govern normal eruptions at Stromboli** *GEOPHYSICAL RESEARCH LETTERS*
  Suckale, J., Keller, T., Cashman, K. V., Persson, P.
  2016; 43 (23): 12071-12081
- **Rapid ice flow rearrangement induced by subglacial drainage inWest Antarctica** *GEOPHYSICAL RESEARCH LETTERS*
  Elsworth, C. W., Suckale, J.
  2016; 43 (22): 11697-11707
- **Determining conditions that allow a shear margin to coincide with a Rothlisberger channel** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Platt, J. D., Perol, T., Suckale, J., Rice, J. R.
  2016; 121 (7): 1273-1294
- **Collective properties of injection-induced earthquake sequences: 2. Spatiotemporal evolution and magnitude frequency distributions** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*

Dempsey, D., Suckale, J., Huang, Y.
2016; 121 (5): 3638-3665

- **Collective properties of injection-induced earthquake sequences: 1. Model description and directivity bias** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Dempsey, D., Suckale, J.
  2016; 121 (5): 3609-3637
- **Subglacial hydrology and ice stream margin locations** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Perol, T., Rice, J. R., Platt, J. D., Suckale, J.
  2015; 120 (7): 1352-1368
- **Deformation-induced melting in the margins of the West Antarctic ice streams** *JOURNAL OF GEOPHYSICAL RESEARCH-EARTH SURFACE*
  Suckale, J., Platt, J. D., Perol, T., Rice, J. R.
  2014; 119 (5): 1004-1025
- **Deformation-induced melting in the margin of Whillans ice stream (B2), Siple Coast, Antarctica, and implications for ice-stream dynamics** *Journal of Geophysical Research*
  Suckale, J., Platt, J., Rice, J. R.
  2014; 119
- **Crystals stirred up: 2. Numerical insights into the formation of the earliest crust on the Moon** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Suckale, J., Elkins-Tanton, L. T., Sethian, J. A.
  2012; 117
- **Crystals stirred up: 1. Direct numerical simulations of crystal settling in nondilute magmatic suspensions** *JOURNAL OF GEOPHYSICAL RESEARCH-PLANETS*
  Suckale, J., Sethian, J. A., Yu, J., Elkins-Tanton, L. T.
  2012; 117
- **Reply to the comment by Mike R. James et al. on "It takes three to tango: 2. Bubble dynamics in basaltic volcanoes and ramifications for modeling normal Strombolian activity"** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Suckale, J., Hager, B. H., Elkins-Tanton, L. T., Nave, J.
  2011; 116
- **It takes three to tango: 2. Bubble dynamics in basaltic volcanoes and ramifications for modeling normal Strombolian activity** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Suckale, J., Hager, B. H., Elkins-Tanton, L. T., Nave, J.
  2010; 115
- **It takes three to tango: 1. Simulating buoyancy-driven flow in the presence of large viscosity contrasts** *JOURNAL OF GEOPHYSICAL RESEARCH-SOLID EARTH*
  Suckale, J., Nave, J., Hager, B. H.
  2010; 115
- **Large to Moderate Seismicity Induced by Hydrocarbon Production** *The Leading Edge*
  Suckale, J.
  2010; 29: 310-319
- **Probabilistic Seismic Hazard Model for Vanuatu** *BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA*
  Suckale, J., Gruenthal, G.
  2009; 99 (4): 2108-2126
- **High-resolution seismic imaging of the western Hellenic subduction zone using teleseismic scattered waves** *GEOPHYSICAL JOURNAL INTERNATIONAL*
  Suckale, J., Rondenay, S., Sachpazi, M., Charalampakis, M., Hosa, A., Royden, L. H.
  2009; 178 (2): 775-791
- **INDUCED SEISMICITY IN HYDROCARBON FIELDS** *ADVANCES IN GEOPHYSICS, VOL 51*
  Suckale, J.

2009; 51: 55-106