

Danica L. Roth

Assistant Professor
Department of Geology and Geological Engineering
Colorado School of Mines

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EDUCATION

2008 B.A., Physics, University of California Berkeley
2008 B.A., Astronomy, University of California Berkeley
2016 Ph.D., Earth Sciences, University of California Santa Cruz, advised by Prof. Noah J. Finnegan and Prof. Emily E. Brodsky:
“*Deciphering the seismic signal of sediment transport in rivers*”

PROFESSIONAL POSITIONS

2019 - present *Assistant Professor*, Department of Geology and Geological Engineering, Colorado School of Mines
2016 - 2018 *NSF Postdoctoral Fellow*, University of Oregon, advised by Prof. Joshua J. Roering and Prof. David J. Furbish:
“*Evaluating the controls of hillslope morphology on nonlocal sediment transport: analytical and experimental approaches*”
2009 - 2016 *Graduate Research & Teaching Assistant*, UC Santa Cruz
2008 *Undergraduate Student Instructor*, UC Berkeley
2008 *NSF REU Summer Intern*, Carl Sagan Center for the Study of Life in the Universe, SETI Institute

PUBLICATIONS

Roth, DL, Allstadt, K, Gualtieri, L, Helmstetter, A, Bartholomaus, T, Tsai, V, Hovius, N. *Environmental Seismology: Progress and Challenges*. Journal of Geophysical Research: Earth Surface (commissioned review, Grand Challenges in the Earth and Space Sciences special issue – **in prep.**).

Roth, DL, Doane, T, Roering, JJ, Furbish, DJ, Zettler-Mann, A. *Slope, roughness and grain size control particle motion on burned and vegetated hillslopes*. (**in prep.**).

Doane, T, **Roth, DL**, Furbish, DJ, Roering, JJ. (2019). *Compression and decay of hillslope topographic variance in Fourier wavenumber domain*. Journal of Geophysical Research: Earth Surface, 124, doi: 10.1029/2018JF004724.

Roth, DL, Finnegan, NJ, Brodsky, EE, Rickenmann, D, Turowski, JM, Badoux, A and Gimbert, F. (2017). *Bedload transport and boundary roughness changes as competing causes of hysteresis in the relationship between river discharge and seismic amplitude recorded near a steep mountain stream*. Journal of Geophysical Research: Earth Surface, doi: 10.1002/2016JF004062.

Roth, DL, Brodsky, EE, Finnegan, NJ, Rickenmann, D, Turowski, JM, Badoux, A. (2016). *Bedload sediment transport inferred from seismic signals near a river*. Journal of Geophysical Research: Earth Surface, 121(4): 725-747.

Roth, DL, Finnegan, NJ, Brodsky, EE, Cook, KL, Stark, CP, and Wang, HW. (2014). *Migration of a coarse fluvial sediment pulse detected by hysteresis in bedload generated seismic waves*. Earth and Planetary Science Letters, 404: 144-153.

Burr, DM, Jacobsen, RE, **Roth, DL**, Phillips, CB, Mitchell, KL, and Viola, D. (2009), *Fluvial network analysis on Titan: Evidence for subsurface structures and west-to-east wind flow, southwestern Xanadu*. Geophysical Research Letters, 36: 22.

SELECTED TALKS • POSTERS • SEMINARS

Roth, DL. (2019). *Throwing rocks down hills: how slope, roughness and grain size control nonlocal particle motion on burned and vegetated hillslopes*. Talk presented at the Department of Geosciences seminar series, Colorado State University - Fort Collins, September 5, 2019. **INVITED**

Roth, DL. (2019). *Rivers and hillslopes: deciphering the signal of sediment transport*. Talk presented at the Geography Department Colloquium, University of Colorado - Boulder, February 22, 2019. **INVITED**

Roth, DL. (2019). *Rivers and hillslopes: deciphering the signal of sediment transport*. Talk presented at the Department of Geophysics Heiland Lecture Series, Colorado School of Mines, January 30, 2019. **INVITED**

Roth, DL. (2018). *Deconvolving the signal of sediment transport in rivers and on hills*. Talk presented at the Reed College Physics Department Seminar, January 31, 2018. **INVITED**

Roth, DL, Roering, JJ, Doane, T, Furbish, DJ. (2017). *Topographic roughness and steep hillslopes: effects of vegetation and fire on nonlocal sediment transport and surface morphology*. Talk EP31F-03, 2017 Fall Meeting, AGU, New Orleans, LA.

Doane, T, **Roth, DL**, Furbish, DJ, Roering, JJ. (2017). *Compression and decay of hillslope topographic variance in Fourier wavenumber domain*. Talk EP31-04, 2017 Fall Meeting, AGU, New Orleans, LA.

Roth, DL (2017). *Deciphering the seismic signal of bedload sediment transport in rivers*. Talk presented at the EGU Galileo Conference: From process to signal—advancing environmental seismology, Ohlstadt, Germany, 6-9 June, 2017. **INVITED**

Roth, DL, Finnegan, NJ, Brodsky, EE, Rickenmann, DM, Turowski, JM, Badoux, A, and Gimbert, F. (2016). *Hysteresis in both sediment transport and water turbulence contribute to seismic hysteresis in a steep mountain stream*. Poster EP33D-1013, 2016 Fall Meeting, AGU, San Francisco, CA.

Roth, DL, Finnegan, NJ, Brodsky, EE, Turowski, JM, Wyss, CR, Badoux, A, and Schneider, J. (2015). *Bedload sediment transport embedded in seismic signals generated from a mountain stream*. Talk EP51D-06, 2015 Fall Meeting, AGU, San Francisco, CA.

Finnegan, NJ, **Roth, DL**, Brodsky, EE, Hsu, L. (2015). *Hydrograph Asymmetry Drives Bedload Transport Hysteresis: Evidence from Fluvial Seismology*. Talk EP54A-04, 2015 Fall Meeting, AGU, San Francisco, CA.

- Roth, DL**, Brodsky, EE, Finnegan, NJ, Turowski, JM, Wyss, CR and Badoux, A. (2014). *The Seismic Signal of Sediment Transport in Rivers*. Talk S43C-07, 2014 Fall Meeting, AGU, San Francisco, CA. **INVITED**
- Roth, DL**, Brodsky, EE, Finnegan, NJ, Turowski, JM, Wyss, CR and Badoux, A. (2014). *Seismic Monitoring of Bedload Transport in a Steep Mountain Catchment*. Poster EP53B-3662, 2014 Fall Meeting, AGU, San Francisco, CA.
- Roth, DL**. (2014). *Rocks go boink: how much does river bedload shake the bed?* Talk presented at 10th Annual UCSC Graduate Research Symposium, 9 May, 2014.
- Roth, DL**, Brodsky, EE, Finnegan, NJ, Cook, KL, Wang, HW, and Stark, CP. (2013). *Interpretations of bedload generated seismic waves on the Chijiawan River, Taiwan*. Poster EP53D-0857, 2013 Fall Meeting, AGU, San Francisco, CA.
- Roth, DL**, Brodsky, EE, Finnegan, NJ, Cook, KL, Wang, HW, and Stark, CP. (2013). *Interpretations of bedload generated seismic waves on the Chijiawan River, Taiwan*. Talk presented at the International Workshop of Acoustic and Seismic Monitoring of Bedload and Mass Movements, Birmensdorf, Switzerland, Swiss Federal Research Institute WSL, 4-7 Sept., 2013. **INVITED**
- Roth, DL**, Brodsky, EE, Finnegan, NJ, and Stark, CP. (2011). *A collision-based model for measuring bedload transport from the seismic waves generated by rivers*. Talk EP22A-05, 2011 Fall Meeting, AGU, San Francisco, CA.
- Jacobsen, RE, **Roth, DL**, Burr, DM, Phillips, CB, Mitchell, KL. (2008). *Identification, Mapping, and Measurement of Titan Fluvial Features*. Poster P21A-1315, 2008 Fall Meeting, AGU, San Francisco, CA.

OTHER PRODUCTS

- (2017). SV01:U-013 – Noble 1 (PS01). UNAVCO Inc., TLS Data Set, doi:10.7283/R3W38X.
- (2017). SV01:U-013 – Burn 1 (PS02). UNAVCO Inc., TLS Data Set, doi:10.7283/R3R95M.
- (2017). SV01:U-013 – Noble 2 (PS03). UNAVCO Inc., TLS Data Set, doi:10.7283/R3MM43.

SELECTED AWARDS • HONORS • FELLOWSHIPS • GRANTS

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| 2019 | Travel Stipend Award, Early Career Geoscience Faculty Workshop, NAGT |
| 2017 | Early Career Scientist Travel Grant, EGU Galileo Conference |
| 2017 | Pilot Study UAS Support, Center for Transformative Environmental Monitoring Programs |
| 2016 | NSF Earth Sciences Postdoctoral Fellowship |
| 2016 | Chancellor's Achievement Award for Diversity, GEODES Founding Members, UCSC |
| 2014 | Dean's Award (Physical & Biological Sciences), Graduate Research Symposium, UCSC |
| 2014 | EPS Departmental Award for Best Presentation, Graduate Research Symposium, UCSC |
| 2011 | Honorable Mention, NSF Graduate Research Fellowships Program |
| 2009 | Eugene Cota-Robles Fellowship, UCSC |
| 2002 | Golden State Governor's Scholars Award for Math |

SELECTED TEACHING EXPERIENCE

Professor

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| Spring, 2020 | High Resolution Topographic Data Collection & Analysis (GEGN-598), CSM |
| Spring, 2020 | Wildfire, Erosion and Hazards Seminar (GEGN-698), CSM |
| Fall, 2019 | Engineering Terrain Analysis (GEGN-203), CSM |
| Fall, 2019 | Advanced Physical Geology Lab (GEGN-205), CSM |

Teaching Assistant

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| 2016 | Climate Change and Policy (EART-191), UC Santa Cruz |
| 2012, 2015, 2016 | Geomorphology (EART-140), UC Santa Cruz |
| 2015 | Geophysics (EART-110C), UC Santa Cruz |
| 2015 | Geology of National Parks (EART-15, online course), UC Santa Cruz |
| 2012, 2014 | California Geology (EART-5), UC Santa Cruz |
| 2013 | Geologic Principles (EART-10), UC Santa Cruz |
| 2011 | Earth Science and the Cinema (EART-4), UC Santa Cruz |
| 2010 | Overview of the Universe (ASTR-2), UC Santa Cruz |
| 2008 | Introduction to General Astronomy (ASTRON-C10), UC Berkeley |

SELECTED PROFESSIONAL DEVELOPMENT

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| 2019 | Early Career Geoscience Faculty Workshop: Teaching, Research and Managing Your Career, NAGT |
| 2019 | Faculty Success Program, National Center for Faculty Development & Diversity |
| 2019 | Deep Neural Networks Clinic, CSDMS Annual Meeting – Bridging Boundaries |
| 2018 | Advancing the Analysis of High Resolution Topography Workshop (A2HRT), NSF EarthCube |
| 2018 | Software Carpentry Workshop, CSDMS Annual Meeting – Geoprocesses, Geohazards |
| 2018 | Summer Institute for Earth-Surface Dynamics, NCED |
| 2018 | Earth Educators Rendezvous, NAGT |
| 2017 | Terrestrial Laser Scanning (TLS) Processing and Data Products Short Course, UNAVCO |
| 2017 | Strategic Planning Workshop on UO Science Education, University of Oregon |
| 2017 | Summer Institute on Scientific Teaching, Yale Center for Teaching and Learning |
| 2011-12, 2014 | Professional Development Program, Institute for Scientist & Engineer Educators, UCSC |
| 2012 | Joint USGS-CUAHSI Sediment Hydroacoustics Workshop |
| 2011 | Short course 519A: <i>Teaching Students How to Learn</i> , GSA |
| 2011 | Short course 519C: <i>Retooling Your Geosciences Class: Strategies to Assess Learning & Improve Student Success</i> , GSA |

SELECTED PROFESSIONAL & PUBLIC SERVICE

Leadership Positions

2019 - present *Department of Geology and Geological Engineering Representative*, Graduate Council, Colorado School of Mines
2017 - 2018 *Committee Member*, University of Oregon Postdoctoral Association
2015 - 2016 *Co-Founder*, Geoscientists Encouraging Openness and Diversity in the Earth Sciences (GEODES), UCSC
2016 *Vice President*, Women in Science and Engineering (WiSE), UCSC
2015 - 2016 *Co-Founder*, WiSE Up: reading and discussion group for equity in STEM, UCSC
2014 - 2015 *Outreach Coordinator*, Women in Science and Engineering (WiSE), UCSC
2014 - 2015 *WiSE Representative*, Advisory Council on Campus Climate, Culture and Inclusion (ACCCCI), UCSC

Professional Service

2019 *Panelist*, IRIS Webinar: “Geohazards breakout – Cryosphere/Hydrosphere”
2019 *Panelist*, CUAHSI-AGU H3S Cyberseminar: “Beyond Grad School: a Guide to Landing Your Dream Job”
2019 *Panelist*, NSF-EAR Postdoctoral Fellowship Program Review Panel
2018, 2019 *Co-Convener & Chair*, AGU Session: “Environmental Seismology: Using Geophysical Tools for Earth Surface Processes Research”
2018 *Co-Convener & Chair*, AGU Session: “From Granular Physics to Geomorphology: Scaling Surface Processes Beyond the Continuum”
2017 *Organizer*, Environmental Seismology Networking Event, AGU Fall Meeting
2014 *Co-Convener*, AGU Session S41A: “Ambient Seismic Investigations: Oceans, Ice, Environment, and Climate”

Journal & Proposal Peer Reviews: Earth Surface Dynamics, Journal of Geophysical Research – Earth Surface, Science, Geophysical Journal International, Earth Surface Processes and Landforms, NSF – EAR

Community & Pedagogic Outreach

2019 *Instructor*, Girls Lead the Way STEM & Leadership Conference for High School Girls, SWE, Colorado School of Mines
2017 *Instructor*, STEMposium Workshop, Arts & Technology Academy, Eugene, OR
2017 - 2019 *Participant/Fundraiser*, Science-A-Thon (annual science outreach and fundraising social media event)
2016 *Presenter*, STEAM: STEM Meets Art Through WiSE, Synberc Expanding Potential Workshop, UC Berkeley
2015 *Organizer/Speaker*, Science Communication Workshop, UCSC
2015 *Planning Committee*, WiSE Women in STEM Pop-up Museum Project, Santa Cruz
2010 - 2015 *Volunteer/Coordinator*, numerous K-12 and community science outreach events, Santa Cruz & Monterey Bay Area
2012 - 2014 *Instructor*, “3-Kinds of Learning: Comparing Approaches” Workshop, EDUC 221 (Science Learning and Teaching in Elementary Classrooms) and EDUC 185C (Intro to Teaching Science), UCSC
2011, 2014 *Instructor & Activity Design Team Member (2011) / Leader (2014)*, Workshops for Engineering and Science Transfer Students (WEST), UCSC
2012 *Instructor & Activity Design Team Leader*, Preparation for Research Experiences Program (PREP) Short Course, Institute for Astronomy, UH Manoa, HI