

# Rachel C. Glade

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<b>PROFESSIONAL APPOINTMENTS</b>	<b>University of Rochester</b> Assistant Professor PI of DRIP (Dirt, Rivers, Ice, Particles) Lab Earth and Environmental Sciences; Mechanical Engineering	2021-present
	<b>Los Alamos National Laboratory</b> Postdoctoral Research Associate, EES-14 Mentor: Joel Rowland	2019 – 2021
<b>EDUCATION</b>	<b>University of Colorado, Boulder:</b> Ph.D. in Geology Advisor: Robert S. Anderson Thesis: “Hillslope evolution in block-controlled landscapes”	May 2019
	<b>University of Pennsylvania:</b> B.A. in Geology Thesis: “Formation and morphology of aeolian coarse-grained ripples in White Sands, NM”	May 2014

**PUBLICATIONS**  
\* = postdoc  
\*\* = graduate student  
\*\*\* = undergraduate student  
Underline indicates member of DRIP lab

## In Review

\*Voigtländer et al., including Rachel Glade. Soft matter physics of the ground beneath our feet. In revision at *Soft Matter*.

## Peer-Reviewed

- [15] \*\*J. O. Albrigtsen, B. A. Wing, R. C. Glade and R. S. Anderson. Stable Isotopes Constrain Water Seepage from Gnammas into Bare Granitic Bedrock. *Geophysical Research Letters*. DOI:10.1029/2023GL107428
- [14] \*David Cúñez, \*\*\*Div Patel, Rachel Glade. How particle shape effects granular segregation in industrial and geophysical flows. *PNAS* 121 (6) DOI: 10.1073/pnas.2307061121. Featured in Nautilus, UR News Center.
- [13] Charles Merritt Shobe, \*\*Samuel J Bower, Aaron E Maxwell, Rachel Glade, \*\*\*Nacere Mohamed Samassi (2023) The uncertain future of mountaintop-removal-mined landscapes 1: How mining changes erosion processes and variables. *Geomorphology*.
- [12] Pouragha, M., Jebeli, Mohammadreza, \*\* Glade, R.C. Failure of Partially Saturated Frozen Soils: a Micromechanical Analysis (2023). *Cold Regions Science and Technology*
- [11] Del Vecchio, J.\*, Lathrop, E.,\*\*, Dann, J.,\*\* Andresen, C., Collins, A., Fratkin, M.,\*\* Zwieback, S., Glade, R.C. and Rowland, J. (2023) Patterns and rates of soil movement and shallow failures across several small watersheds on the Seward Peninsula, Alaska. *Earth Surface Dynamics*.
- [10] Glade, R.C., Fratkin, M.,\*\*, Pouragha, M., Seiphooori, A., and Rowland, J. Arctic soil patterns analogous to fluid instabilities (2021) *PNAS*, 118 (21) DOI: 10.1073/pnas.2101255118. *Highlighted by the US Arctic Research Commission; News coverage by Los Alamos National Lab, phys.org*
- [9] Shobe, C.M., Turowski, J.M., Nativ, R., Glade, R.C., Bennett, G.L., and Dini, B. The role of large, infrequently mobile boulders in modulating landscape evolution and geomorphic hazards (2021) *Earth-Science Reviews*, vol. 220, DOI: 10.1016/j.earscirev.2021.103717.
- [8] Barnhart, K.R., Tucker, G.E., Doty, S., Glade, R.C., Shobe, C.M., Rossi, M.W., and Hill, M.C. (2020) Projections of landscape evolution on a 10,000 year timescale with assessment and partitioning of uncertainty sources. *JGR Earth Surface*. doi: 10.1029/2020JF005795.
- [7] Barnhart, K.R., Tucker, G.E., Doty, S., Shobe, C.M., Glade, R.C., Rossi, M.W., and Hill, M.C. (2020) Inverting topography for landscape evolution model process representation: Part 3, Determining parameter ranges for select mature geomorphic transport laws and connecting changes in fluvial erodibility to changes in climate. *JGR Earth Surface*. doi: 10.1029/2019JF005287. *Top-cited article*.

- [6] Barnhart, K.R., Tucker, G.E., Doty, S., Shobe, C.M., Glade, R.C., Rossi, M.W., and Hill, M.C. (2020) Inverting topography for landscape evolution model process representation: Part 2, calibration and validation. *JGR Earth Surface*. doi: 10.1029/2018JF004963. *Top-cited article*.
- [5] Barnhart, K.R., Tucker, G.E., Doty, S., Shobe, C.M., Glade, R.C., Rossi, M.W., and Hill, M.C. (2020) Inverting topography for landscape evolution model process representation: Part 1, conceptualization and sensitivity analysis. *JGR Earth Surface*. doi: 10.1029/2018JF004961
- [4] Glade, R.C.(E), Shobe, C.M.(E) Anderson, R.S., and Tucker, G.E. (2019) Canyon shape and erosion dynamics governed by channel-hillslope feedbacks. *Geology*. (E) = Equal author contributions.
- [3] Barnhart, K.R., Glade, R.C., Shobe, C.M., and Tucker, G.E. (2019) terrainbento 1.0: a Python package for multi-model analysis in long-term drainage basin evolution. *Geoscientific Model Development*, doi:10.5194/gmd-2018-204
- [2] Glade, R.C., Anderson, R.S. (2018), Quasi-steady evolution of hillslopes in layered landscapes: An analytic approach, *JGR Earth Surface*, v. 123.1, 26-45, doi: 10.1002/2017JF004466. *Featured on journal cover*.
- [1] Glade, R.C., Anderson, R.S., and Tucker, G.E., (2017), Block-controlled hillslope form and persistence of topography in rocky landscapes, *Geology*, v. 45, p. 311-314, doi:10.1130/G38665.1.

### Technical Reports and Theses

Glade, R.C. (2019) Hillslope evolution in block-controlled landscapes. Ph.D. Dissertation, University of Colorado, Boulder.

West Valley Erosion Working Group Modeling Team including Glade, R.C. (2018) Modeling long-term erosion at the West Valley Demonstration Project and Western New York Nuclear Services Center. Report prepared for the U.S. Department of Energy and New York State Energy Research and Development Authority

Foster, M.A., Anderson, R.S., Rindfleisch, P.R., Birkeland, P.W., Redwine, J.R., Pitlick, J., and Glade, R.C., (2016), The 2016 Kirk Bryan field trip: Quaternary landslides, fluvial terraces, and recent geomorphic events along the Colorado Front Range, in Keller, S.M., and Morgan, M.L., eds., *Unfolding the Geology of the West: Geological Society of America Field Guide 44*, p. 267–289, doi:10.1130/2016.0044(12).

Glade, R.C., Jerolmack, D.J. (2014) Formation and morphology of aeolian coarse-grained ripples at White Sands, New Mexico. University of Pennsylvania Undergraduate Thesis.

### Science Writing and Commentary

Furbish, D.J., Jerolmack, D.J., and Glade, R.C. (2020) The Brickyard in 2020. Vanderbilt University Institutional Repository.

### GRANTS

Packard Fellowship for Science and Engineering (\$875k)	2023-2028
Collaborative NSF Grant (\$615k)	2023-present
“Prospecting for critical element deposits: an interdisciplinary approach using experimental geochemistry and field-informed modeling of sediment transport”	
Petroleum Research Fund Doctoral New Investigator Grant (\$110k)	2021-2023
“The Probabilistic Physics of Sediment Diffusion in Rivers”	
University of Colorado Geological Sciences Travel Grant	2018
University of Colorado Graduate School Domestic Travel Grant	2018
GSA John T. and Carol G. McGill Research Award	2017
Shell Research Grant	2015

### AWARDS & HONORS

Packard Fellow for Science and Engineering	2023
Levinson/Shapiro Faculty Scholar	2022
Marinus Smith Teaching Award	2019
Jai Syvitski Student Modeler Award, 2nd Place	2018
NSF Graduate Research Fellowship, Honorable Mention	2016
Delaware Valley Geo-Institute Scholarship	2013

	SEG/Anadarko Scholarship for Geoscience Studies	2010
<b>TEACHING</b>	<b>University of Rochester Department of Earth and Environmental Sciences</b>	
	Geophysical Flows	Fall 2023
	Earth Surface Processes	Spring 2022/2023/2024
	Sediment Transport in Fluid Flows	Fall 2022
	<b>University of Colorado, Boulder Department of Geological Sciences</b>	
	Geomorphology, Instructor of record	Spring 2019
	Fluid Earth, Graduate Teaching Assistant	Fall 2018
	Intro Geology Lab (4 sections), Graduate Teaching Assistant	2014 – 2015
	<b>University of Pennsylvania Department of Earth and Environmental Science</b>	
	Intro Geology, Teaching Assistant	Fall 2013
<b>MENTORSHIP</b>	<b>Postdocs</b>	
	Fernando David Cúñez	2021-2023
	<b>PhD Students</b>	
	JohnPaul Sleiman	2021-
	Nacere Mohamed Samassi	2021-
	<b>Undergraduates</b>	
	Elisa Yang	2023-
	Div Patel	2022-
	Avi Skolnick	Summer 2023
	Yisheng Zhong	2022-2023
<b>STUDENT COMMITTEES</b>	Joel-Joel Legre, PhD, UR Earth and Environmental Science	current
	Sarah Williams, PhD, Vanderbilt Earth and Environmental Science	current
	Danielle Bovie, Masters, UR Physics	2023
	Esteban Wright, PhD, UR Physics	2022
<b>INVITED TALKS</b>	University of Minnesota Duluth; “Patterns in granular media” Workshop, Unicamp, Brazil	2023
	Vanderbilt; Dartmouth; UR Mechanical Engineering Department; AGU EPSP Lecture;	
	American Physical Society (APS) March Meeting; Princeton University	2022
	University of Delaware; Georgia Tech; University of British Columbia;	
	AGU Fall Meeting; Syracuse University; University of Rochester (Mech E)	2021
	AGU Fall Meeting; EGU Virtual Meeting	2020
	AGU Fall Meeting; Potsdam German Research Centre for Geosciences	2019
	CSDMS-SEN Annual Meeting	2018
<b>PROFESSIONAL AFFILIATIONS &amp; ACTIVITIES</b>	Reviewer for <i>Nature Communications</i> , <i>Geology</i> , <i>Earth and Planetary Science Letters</i> , <i>Geophysical Research Letters</i> , <i>Earth Surface Processes</i> , <i>JGR: Earth Surface</i> , <i>Holocene</i> , US NSF, <i>Geomorphology</i>	
	Member: American Physical Society, American Geophysical Union, American Physical Society, Geological Society of America, Association for Women Geoscientists	
	Session convener: “Changing Permafrost Landscapes” at <i>AGU Fall Meeting</i>	2023
	Session convener: “Granular and Fluid Physics in Geomorphology” at <i>AGU Fall Meeting</i>	2022
	Session convener: “Changing Permafrost Landscapes” at <i>AGU Fall Meeting</i>	2022
	Session convener: “Centennial Session: Leopoldian, Bagnoldian, and Einsteinian geomorphology today” at <i>AGU Fall Meeting</i>	2019
	Session convener: “Heterogeneity in Geomorphic Systems: Driving Forces and Landscape Response” at <i>Geological Society of America Meeting</i>	2016
<b>OUTREACH</b>	Lab tour for local middle and high school students through the Genesee Land Trust	Summer 2022
	Talk for Central Connecticut State University Student Geology and Planetary Club	Spring 2022

Talk for the Rochester Academy of Science Mineral Division	Fall 2021
New Mexico Outreach Coordinator for Association for Women Geoscientists (AWG)	2019 – 2021
Los Alamos Peer Mentoring Network	2019 – 2021
Pikes Peak Regional Science Fair Judge	Spring 2021
Northern New Mexico Physics Summer Camp for Young Women	Summer 2020
Science Fair Judge for Boulder Valley School District	2016 – 2019
Nerd Nite Public Outreach Talk	Spring 2018
Research Experience for Community College Students (RECCS) Poster Judge	2016 – 2017
Research Experiences in Solid Earth Science for Students (RESESS) Poster Judge	2016 – 2017
RESESS Trip Leader, Mountain Research Station, Colorado	Summer 2017
Portal to the Public 6-week Science Communication Workshop	Fall 2015
“Meet a Scientist” event hands-on demonstration, Boulder, Colorado	Fall 2015

**OTHER  
EXPERIENCE**

West Valley Restoration Project: Geomorphic Modeling Specialist	2016– 2018
NASA Student Airborne Research Program	Summer 2013
PIRE Mongolia Project: Fieldwork and lab work	2011- 2013
CRB Geological and Environmental Services, Inc.	Summer 2013

**SELECT  
CONFERENCE  
ABSTRACTS**

Glade, R.C., \*\*Sleiman, J. and \*Cúñez, D (2023) Oobleckian Hillslopes? Viewing solifluction patterns as a rheology-induced instability. Presentation at *AGU Fall Meeting*.

\*\*Samassi, N, \*Cúñez, D and Glade, R.C. (2023) Experiments on the Role of Cohesive Sediments in Fluvial Erosion. Presentation at *AGU Fall Meeting*.

\*\*Sleiman, J, \*Cúñez, D and Glade, R.C. (2023) Are lobate features on Mars quantitatively similar to terrestrial solifluction lobes? Presentation at *AGU Fall Meeting*.

\*Cúñez, D, \*\*\*Patel, D and Glade, R.C. (2023) Granular Segregation Symphony: The Playful Dance of Diverse Particle Shapes. Presentation at *AGU Fall Meeting*.

\*Cúñez, D, \*\*\*Zhong, Y and Glade, R.C. (2023) From romance to breakdown: how salmon’s epic love story erodes riverbeds. Presentation at *AGU Fall Meeting*.

\*\*Samassi, N., \*Cúñez, F.D., Glade, R.C. (2022) Experiments on the Role of Sediment Cohesion on Gully Erosion. Presentation at *AGU Fall Meeting*.

\*\*Sleiman, J., Glade, R.C. (2022) Lobate features on Mars exhibit same scaling as terrestrial solifluction patterns. Presentation at *AGU Fall Meeting*.

\*\*\*Patel, D., \*Cúñez, F.D., Glade, R.C. (2022) Segregation of Bidisperse Granular Material in a Circular Tumbler Flow As a Lens into Riverbed Armoring. Presentation at *AGU Fall Meeting*.

\*\*\*Zhong, Y., \*Cúñez, F.D., Glade, R.C. (2022) Flapping Motion of a Fish-inspired Body and its Impact on Sediment Transport. Presentation at *AGU Fall Meeting*.

\*Cúñez, F.D., Glade, R.C. (2022) Equal-diameter vs equal-volume particles: Which one really matters for shape-induced segregation in sediment transport? Presentation at *AGU Fall Meeting*.

\*Cúñez, F.D., Glade, R.C. (2022) Lateral diffusion and segregation of non-spherical particles in bed-load transport. Presentation at *APS March Meeting*.

Rowland, J., \*Thaler, E., \*Del Vecchio, J., Glade, R.C., Uhlemann, S., Dafflon, B. (2022) Transient Hillslope Responses to Permafrost Loss. Presentation at *AGU Fall Meeting*.

\*Cúñez, F.D., Glade, R.C. (2021) Lateral diffusion and segregation of non-spherical particles in bed-load transport. Presentation at *AGU Fall Meeting*.

Glade, R.C., \*\*Sleiman, J.P., \*\*Fratkin, M., Pouragha, M., Seiphooi, A., Rowland, J.C. (2021) The enigma of lobate soil patterns: Bridging scales, materials, and worlds. Invited talk at *AGU Fall Meeting*.

\*Del Vecchio, J., Rowland, J.C., DiBiase, R.A., Zwieback, S., and Glade, R.C. (2021) Signatures of Permafrost Processes in Fluvial Network Morphology and Change on the Seward Peninsula, Western Alaska, USA Presentation at *AGU Fall Meeting*.

Glade, R.C., Shobe, C.M., Turowski, J., Nativ, R., Bennet, G., and Dini, B. (2021) Progress in boulder-mantled landscapes: A Sisyphean challenge. Poster presentation at *AGU Fall Meeting*, New Orleans, LA.

Glade, R.C., \*\*Fratkin, M., Pouragha, M., Seiphooi, A., Rowland, J.C. (2021) Arctic soil patterns analogous to fluid instabilities. Poster presentation at *DOE ESS PI Meeting*.

Shobe, C.M., Turowski, J., Nativ, R., Glade, R.C., Bennet, G., and Dini, B. (2021) Great big boulders and landscape self-organization. Poster presentation at *GSA Connects 2021*, Portland, Oregon.

Glade, R.C., Fratkin, M., Pouragha, M., Seiphoori, A., Rowland, J. (2021) Solifluction patterns analogous to fluid instabilities. Poster presentation at *CSDMS Annual Meeting*.

Glade, R.C., \*\*Fratkin, M., Pouragha, M., Seiphoori, A., Rowland, J. (2020) Soil drips and droplets: Solifluction patterns analogous to fluid instabilities. Invited talk at *American Geophysical Union Fall Meeting*.

Rowland, J., Del Vecchio, J, Glade, R.C., \*\*Fratkin, M., Lathrop, E., and Zwieback, S. (2020) Patterns and rates of soil movement and shallow failures across several small watersheds on the Seward Peninsula, Alaska. Poster presentation at *AGU Fall Meeting*.

Barnhart, K.R., Tucker, G.E., Doty, S., Glade, R.C., Shobe, C.M., Rossi, M.W., and Hill, M.C. (2020) Lessons and challenged in reproducible computational research from the development and application of landscape evolution models to waste site remediation. Poster presentation at *AGU Fall Meeting*.

Tucker, G.E., Barnhart, K. R., Doty, S., Glade, R.C., Shobe, C.M., Rossi, M.W., and Hill, M.C. (2020) Ensemble forecasting of long-term erosion at a hazardous waste site. Oral presentation at *AGU Fall Meeting*.

Glade, R.C., Fratkin, M., Rowland, J., and Nutt, M (2020), Solifluction patterns arising from competition between gravity and cohesion. Presentation at *EGU Virtual Meeting*

Glade, R.C., Shobe, C.M., Anderson, R.S., and Tucker, G.E. (2019) How do channel-hillslope feedbacks modulate river canyon evolution? Invited talk at *American Geophysical Union Fall Meeting*.

Glade, R.C., Shobe, C.M., Anderson, R.S., and Tucker, G.E. (2019), Canyon shape and erosion dynamics governed by channel-hillslope feedbacks, Poster Presentation at *CSDMS-SEN Annual Meeting*, Boulder, CO

Glade, R.C. and Anderson, R.S. (2018), From scallops to flatirons: Planview patterns in layered landscapes, Oral Presentation at *American Geophysical Union Fall Meeting*, Washington D.C.

Shobe, C.M., Glade, R.C., Anderson, R.S., and Tucker, G.E. (2018), Chaotic chasms: River canyon evolution governed by channel-hillslope feedbacks, Poster Presentation at *American Geophysical Union Fall Meeting*, Washington D.C.

Barnhart, K.R., Tucker, G.E., Doty, S., Hill, M., Rossi, M., Shobe, C.M., and Glade, R.C. (2018), Inverting topography for landscape evolution model process representation, Oral Presentation at *American Geophysical Union Fall Meeting*, Washington D.C.

Shobe, C.M., Glade, R.C., Tucker, G.E., and Anderson, R.S. (2018) Modeling the 2-D evolution of blocky landscapes: River canyons, Poster Presentation at *CSDMS-SEN annual meeting*, Boulder, CO.

Glade, R.C., Shobe, C.M., Anderson, R.S., and Tucker, G.E. (2018) Modeling the 2-D evolution of blocky landscapes: Layered hillslopes, Poster Presentation at *CSDMS-SEN annual meeting*, Boulder, CO.

Glade, R.C., Shobe, C.M., Anderson, R.S., and Tucker, G.E. (2018) Baselevel signal propagation through a block-controlled landscape, Poster Presentation at *Coupling of Tectonic and Surface Processes Workshop*, Boulder, CO.

Glade, R.C. and Anderson, R.S. (2018), Drone photogrammetry of solifluction lobes at Niwot Ridge, Colorado, Poster Presentation at *EarthCube Advancing the Analysis of High Resolution Topography Workshop*, Broomfield, CO.

Barnhart, K.R., Tucker, G.E., Doty, S., Hill, M.C., Rossi, M.W., Shobe, C.M., and Glade, R.C. (2018) Uncertainty in the prediction of erosion on geologic time scales, Presentation at *International Environmental Modeling and Software Society annual meeting*.

Glade, R.C., Anderson, R.S. (2017), Steady evolution of hillslopes in layered landscapes: self-organization of a numerical hogback, Oral Presentation at *American Geophysical Union Fall Meeting*, New Orleans, LA.

Glade, R.C., Anderson, R.S. (2017), Legions of lobes: Self-organization of solifluction features at Niwot Ridge LTER, Oral Presentation at *Geological Society of America Meeting*, Seattle, WA.

Glade, R.C. and Anderson, R.S. (2017), Numerical modeling of hillslope evolution: Lithologic and climatic controls, Oral Presentation at *Impacts of a changing cryosphere on lakes and streams in mountain regions: US-China Workshop* Qinghai Lake, China.

Glade, R.C., Anderson, R.S., and Tucker, G.E., (2016), Hillslope evolution in landscapes dominated by layered rocks, Oral Presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA.

Glade, R.C., Anderson, R.S., and Tucker, G.E., (2016), Blocks control hillslope evolution in layered landscapes, Oral Presentation at *GSA Annual Meeting*, Denver, CO.

Glade, R.C., Anderson, R.S., and Tucker, G.E., (2016), Blocks control hillslope evolution in layered landscapes, Poster Presentation at *Community Surface Dynamics Modeling System- Sediment Experimentalists Network Meeting*, Boulder, CO.

Glade, R.C., Anderson, R.S. (2015) Honoring the reality of blocky hillslopes: Case study of a vertical dike at Shiprock, New Mexico, Poster Presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA.

Glade, R.C., Jerolmack, D.J., and Pelletier, J.D., (2014), Formational mechanisms and morphology of windblown coarse-grained sand ripples at White Sands, New Mexico, Poster Presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA.

Glade, R.C., Grigsby, S., and Ustin, S.L., (2013), Relationships between topography and leaf area index in the Sierra Nevada Mountains, California, Poster Presentation at *American Geophysical Union Fall Meeting*, San Francisco, CA.