

Paul W. Richardson
Postdoctoral Research Hydrologist
USDA Forest Service
Pacific Southwest Research Station
1700 Bayview Dr.
Arcata, CA 95521

Phone (206) 605-8898
Email paul.richardson@usda.gov
Website <https://pwrichardson.com>

Education

- 2015 **Ph.D.** Massachusetts Institute of Technology, Department of Earth, Atmospheric & Planetary Sciences, Cambridge, MA (Adviser: Prof. Taylor Perron)
2009 **B.S.** University of Washington, Department of Earth & Space Sciences (minor in Applied Math), Seattle, WA

Research Experience

- 2018- **Postdoctoral Researcher** | USDA Forest Service, Pacific Southwest Research Station
(Supervisor: Dr. Joe Wagenbrenner)
2016-17 **Postdoctoral Researcher** | University of Oregon, Earth Sciences
(Supervisor: Prof. Leif Karlstrom)
2009-15 **Graduate Student Researcher** | MIT, Earth, Atmospheric & Planetary Sciences
(Adviser: Prof. Taylor Perron)
2008 **Undergraduate Student Research Program Intern** | NASA, Goddard Space Flight Center
(Advisers: Dr. Herbert Frey & Dr. Jacob Bleacher)
2007-09 **Student Research Assistant** | University of Washington, Earth & Space Sciences
(Advisers: Prof. Elizabeth Nesbitt & Dr. Kenny Matsuoka)

Teaching Experience

- 2021 **Guest lecture** | GEOL 550: Fluvial Processes, Humboldt State University
2018 **Guest lecture** | SOIL 460: Wildland Soil Mgmt & Erosional Control, Humboldt State University
2017 **Lecturer** | GEOL 137: Mountains and Glaciers, University of Oregon
2017 **Lecturer** | GEOL 363: MATLAB for Earth Scientists, University of Oregon
2017 **Lecturer** | GEOL 406: Field Studies in Intrusions and Ice, University of Oregon
2015 **Visiting Lecturer** | GEOS 218: Geomorphology, Wellesley College
2013 **Graduate Teaching Assistant** | 12.163/463: Geomorphology, MIT
2009 **Graduate Teaching Assistant** | 12.163/463: Geomorphology, MIT
2008 **Undergraduate Teaching Assistant** | ESS 213: Evolution of Earth, University of Washington
2007 **Undergraduate Teaching Assistant** | ESS 101: Introduction to Geological Sciences,
University of Washington

Grants, Fellowships, Honors, & Awards

- 2021 USDA Forest Service research grant for “Pairing instream restoration with disturbances to restore headwater meadows and reduce downstream sedimentation,” \$835,700 (PI: Karen Pope; Co-PI: Paul Richardson)
2020 USDA Forest Service research grant for “Documenting and measuring changes at Caspar Creek with aerial images,” \$10,575 (PI: Paul Richardson)
2010-13 National Defense Science and Engineering Graduate Fellowship (NDSEG), ~\$300,000
2010 GSA Graduate Student Research Grant, \$3,600

- 2009 Dr. Gerald A. Soffen Memorial Student Travel Grant GSA, \$500
 2009 Stephen E. Dwornik Student Research Paper Award, LPSC conference
 2008-09 Earth & Space Sciences' Honors Program, University of Washington
 2008 Howard and Leila Coombs Scholarship, University of Washington, \$2000
 2007-08 Mary Gates Scholar, University of Washington, \$4000

Mentoring Experience & Community Service

- 2021- Review Editor for *Frontiers in Water*
 2020 Convener for AGU fall session "Fluvial systems: understanding dynamics, interactions, and resultant forms across a range of scales"
 2019- Organizer of Fire, **F**orestry, **H**ydrology & **G**eomorphology (FFoHG) Discussion Seminar
 2018 Coordinator for AGU Fall Meeting Outstanding Student Presentation Award for EPSP section
 2016- Reviewer for *GRL*, *JGR: Earth Surface*, *Hydrological Processes*, and *WRR*
 2016 Chair for AGU fall session "Volcanic Plumbing Systems and Surface Processes III Posters"
 2014 MIT Discover EAPS field trip leader to Mt. Washington, NH
 2013-14 Co-advised senior thesis of Naomi Schurr, MIT, Earth, Atmospheric & Planetary Sciences
 2012 MIT Discover EAPS field trip leader to Yellowstone National Park
 2010-11 Mentor for the Boston Scholars Program

Publications

Peer-reviewed articles

- Richardson, P. W.**, P. H. Cafferata, S. F. Dymond, E. T. Keppeler, J. W. Wagenbrenner, & J. A. Whiting. Past and Future Roles of Paired Watersheds: A North American Inventory and Anecdotes From the Caspar Creek Experimental Watersheds. *Submitted to the Journal of American Water Resources Association.*
11. Dymond, S. F., **P. W. Richardson**, L. Webb, E. T. Keppeler, I. D. Arismendi, K. D. Bladon, P. H. Cafferata, H. E. Dahlke, J. Harrington, J. A. Hatten, D. Longstreth, P. Ode, C. G. Surfleet, & J. W. Wagenbrenner (2021). A Field-Based Experiment on the Influence of Stand Density Reduction on Watershed Processes at the Caspar Creek Experimental Watersheds in northern California, *Frontiers In Forests and Global Change*, 4:691732. <https://doi.org/10.3389/ffgc.2021.691732>
10. **Richardson, P. W.**, J. E. Seehafer, E. T. Keppeler, D. G. Sutherland, J. W. Wagenbrenner, K. D. Bladon, S. F. Dymond, & R. P. Cole (2021). Fifty-eight years and counting of watershed science at the Caspar Creek Experimental Watersheds in northern California, *Hydrological Processes*, 35(6), e14207. <https://doi.org/10.1002/hyp.14207>
9. **Richardson, P. W.**, J. W. Wagenbrenner, D. G. Sutherland, & T. E. Lisle (2020). Measuring and modeling gravel transport at Caspar Creek, CA to detect changes in sediment supply, storage, and transport efficiency, *Water Resources Research*, 56(6). <https://doi.org/10.1029/2019WR026389>
8. **Richardson, P. W.**, J. T. Perron, S. R. Miller, & J. W. Kirchner (2020). Unraveling the mysteries of an asymmetric landscape at Gabilan Mesa, CA, *Journal of Geophysical Research Earth Surface*, 125(7), e2019JF005378. <https://doi.org/10.1029/2019JF005378>

7. **Richardson, P. W.**, J. T. Perron, S. R. Miller, & J. W. Kirchner (2020). Modeling the formation of topographic asymmetry by aspect-dependent erosional processes and lateral channel migration, *Journal of Geophysical Research Earth Surface*, 125(7), e2019JF005377. <https://doi.org/10.1029/2019JF005377>
6. **Richardson, P. W.**, & L. Karlstrom (2019). The multi-scale influence of topography on lava flow morphology, *Bulletin of Volcanology*, 81(21), 1-17. <http://doi.org/10.1007/s00445-019-1278-9>
5. **Richardson, P. W.**, J. T. Perron, & N. D. Schurr (2019). The influence of climate on hillslope sediment transport efficiency, *Geology*, 47(5), 423-426. <https://doi.org/10.1130/G45305.1>
4. Karlstrom, L., **P.W. Richardson**, & D. O'Hara, & S. Ebmeier (2018). Magmatic landscape evolution, *Journal of Geophysical Research Earth Surface*, 123(8), 1710-1730. <http://doi.org/10.1029/2017JF004369>
3. Pelletier, J. D., G. A. Barron-Afford, H. Gutierrez-Jurado, E. S. Hinckley, E. Istanbuloglu, L. A. McGuire, G. Niu, M. J. Poulos, C. Rasmussen, **P. W. Richardson**, T. L. Swetnam, & G. E. Tucker (2017). Which way do you lean? Using slope aspect variations to understand Critical Zone processes and feedbacks, *Earth Surface Processes and Landforms*, 43(5), 1133-1154. <http://doi.org/10.1002/esp.4306>
2. Stockmeyer, J. M, J. H. Shaw, N. D. Brown, E. J. Rhodes, **P. W. Richardson**, M. Wang, L. C. Lavin, & S. Guan (2017). Active thrust sheet deformation over multiple rupture cycles: a quantitative basis for relating terrace folds to fault slip rates, *GSA Bulletin*, 129(9-10), 1337-1356. <http://doi.org/10.1130/B31590.1>
1. Perron, J. T., **P. W. Richardson**, K. L. Ferrier, & M. Lapôtre (2012). The root of Branching river networks, *Nature*, 492, 100-103. <http://doi.org/10.1038/nature11672>

Data & numerical models

5. **Richardson, P. W.**, J. E. Sechafer, E. T. Keppeler, D. G. Sutherland, J. W. Wagenbrenner, K. D. Bladon, S. F. Dymond, & R. P. Cole (2021). Caspar Creek Experimental Watersheds Phase 2 (1985-2017) data (2nd Edition). *Forest Service Research Data Archive*. <https://doi.org/10.2737/RDS-2020-0018-2>
4. **Richardson, P. W.**, J. E. Sechafer, E. T. Keppeler, D. G. Sutherland, & J. W. Wagenbrenner (2021). Caspar Creek Experimental Watersheds Phase 1 (1962-1985) data (2nd Edition). *Forest Service Research Data Archive*. <https://doi.org/10.2737/RDS-2020-0017-2>
3. **Richardson, P. W.** (2020). Field measurements of hydraulic conductivity and soil shear strength at Gabilan Mesa, CA. *Harvard Dataverse*. <https://doi.org/10.7910/DVN/VSRHQU>
2. Perron, J. T., B. A. Black, & **P. W. Richardson** (2020). Tadpole: A Landscape Evolution Model. *Zenodo*. <https://doi.org/10.5281/zenodo.3710412>
1. **Richardson, P. W.** & J. W. Wagenbrenner (2020). Supplemental bed load data for the North Fork of Caspar Creek, CA. *Harvard Dataverse*. <https://doi.org/10.7910/DVN/ZKYNQC>

Thesis

Richardson, P. W. (2015). Topographic Asymmetry and Climate Effects on Landscape Evolution. Massachusetts Institute of Technology, Cambridge, MA. *PhD dissertation*

In preparation

Richardson, P. W., K. B. Lininger, S. Hilton, & J. W. Wagenbrenner. Jamming in the channel: large wood in small streams and implications for stream restoration. *In prep for Geomorphology*

Richardson, P. W., J. W. Wagenbrenner, & T. E. Lisle. How does bedload transport respond to timber harvesting?

Richardson, P.W., J. W. Wagenbrenner, E. Keppeler, J. Seehafer, & D. G. Sutherland. Hydrologic, climatic, and sedimentological data collected during two timber harvest experiments at the Caspar Creek Experimental Watersheds, CA, USA from 1962 to 2017. *In prep for Earth System Science Data*

Invited Talks

Richardson, P.W., D. G. Sutherland, J. W. Wagenbrenner, & S. Hilton (2021). Legacy effects of timber harvesting on salmonid habitat at Caspar Creek and avenues for improving habitat during future timber harvests. *Salmonid Restoration Federation Virtual Conference*.

Richardson, P. W. (2021). How does bedload transport respond to timber harvests? Insight from the Caspar Creek Experimental Watersheds in northern California. *Humboldt State University, Department of Geology colloquium*

Richardson, P. W. (2016). Chasing the sun: exploring the role of aspect in landscape evolution. *University of Oregon, Department of Earth Sciences colloquium*

Richardson, P. W., & L. Karlstrom, (2016). Routing lava: is topography enough? *USGS Cascades Volcanic Observatory*

Richardson, P. W., J. T. Perron, & S. R. Miller (2014). Microclimate-induced Lateral Channel Migration as a Driver for Hillslope Asymmetry in Semi-arid Landscapes. *AGU Fall Meeting*

Conference Abstracts & Presentations

Wilcox, K., **P.W. Richardson**, K. Pope & A. Cummings (2021). Leveraging post-fire soil loss: Can we use fire-derived sediment to fill incised channels and restore degraded meadows in the southern Sierra Nevada? *American Geophysical Union Fall Meeting*

Richardson, P.W., S. Hilton & J.W. Wagenbrenner (2021). Wood loading and its effects on sediment transport at the Caspar Creek Experimental Watersheds in northern California. *American Geophysical Union Fall Meeting*

Richardson, P.W. & S. Hilton (2021). Sediment storage and survival of large wood on the North Fork of Caspar Creek. *Caspar Creek Annual Meeting*

- Richardson, P. W.,** J. W. Wagenbrenner, & E. T. Keppeler (2021). Three experimental timber harvests and three lessons from the Caspar Creek Experimental Watersheds in northern California. *CUAHSI Catchment Seminar Series (Research and Observatory catchments: the legacy and the future)*
- Richardson, P. W.** & J. W. Wagenbrenner (2020). Investigating the Influence of Timber Harvests on Bedload Transport. *American Geophysical Union Fall Meeting*
- Richardson, P. W.** (2020). The past, present, and future of bedload transport monitoring at Caspar Creek. *Caspar Creek Annual Meeting*
- Richardson, P. W.,** J. W. Wagenbrenner, & S. Hilton (2019). Decreased bed load transport following timber harvesting and wood input to the North Fork of Caspar Creek, CA. *American Geophysical Union Fall Meeting*
- Richardson, P. W.,** J. W. Wagenbrenner, E. Keppeler, J. Seehafer, D. Sutherland, & P. Cafferata (2019). Fifty-seven years and counting of watershed science at the Caspar Creek Experimental Watersheds in northern California. *American Geophysical Union Fall Meeting*
- Keppeler, E., J. Wagenbrenner, S. Dymond, P. Cafferata, L. Webb, & **P. W. Richardson** (2019). Opening the black box: A 21st century investigation of watershed processes in a managed coast redwood forest, Caspar Creek Experimental Watersheds. *American Geophysical Union Fall Meeting*
- Richardson, P. W.,** & J. W. Wagenbrenner (2019). Assessing the applicability of the Wilcock 2-fraction bedload transport model at the Caspar Creek Experimental Watersheds, CA. *Federal Interagency Sedimentation and Hydrologic Modeling (SEDHYD) Conference*
- Richardson, P. W.** (2018). Gravel transport at Caspar Creek. *Caspar Creek Annual Meeting*
- Richardson, P. W.,** J. W. Wagenbrenner, T. E. Lisle, & D. Sutherland (2018). The power of long-term observation: new insights from 50+ years of monitoring sediment fluxes at the Caspar Creek Experimental Watershed, CA. *American Geophysical Union Fall Meeting*
- Richardson, P. W.** (2018). Sediment transport at Caspar Creek. *Caspar Creek Annual Meeting*
- O'Hara, D., L. Karlstrom, & **P. W. Richardson** (2017). How Does Intrusive Magmatism Influence Landscape Evolution? *IAVCEI Scientific Assembly*
- Richardson, P. W.,** & L. Karlstrom, (2016). Building and characterizing volcanic landscapes with a numerical landscape evolution model and spectral analysis. *American Geophysical Union*
- Stockmeyer, J. M., J. H. Shaw, N. D. Brown, E. J. Rhodes, M. Wang, **P. W. Richardson,** & J. T. Perron (2014). Quaternary fault activity in the Southern Junggar Basin, Northwest, China Revealed From Fluvial Terraces. *Geological Society of America Annual Meeting*
- Richardson, P. W.,** J. T. Perron, & S. R. Miller (2013). Topographic signatures of microclimatic mechanisms for landscape asymmetry. *American Geophysical Union Fall Meeting*
- Richardson, P. W.,** J. T. Perron, & S. R. Miller (2012). Non-structural Origins of Asymmetric Topography in Semi-arid Environments. *American Geophysical Union Fall Meeting*

- Richardson, P. W.**, J. T. Perron, & S. R. Miller (2011). Signatures of Asymmetric Topography: From Measurements to Mechanisms. *American Geophysical Union Fall Meeting*
- Bleacher, J. E., **P. W. Richardson**, W. B. Garry, J. R. Zimbelman, D. A. Williams, & T. R. Orr (2011). Identifying Lava Tubes and their Products on Olympus Mons, Mars and Implications for Planetary Exploration. *Lunar and Planetary Science Conference Annual Meeting*
- Bleacher, J. E., W. B. Garry, J. R. Zimbelman, & **P. W. Richardson** (2009). Field Observations of Rootless Vents over the Pohue Bay Lava Tube, Hawai'i: Comparison with Olympus Mons Lava Fans, Mars. *Lunar and Planetary Science Conference Annual Meeting*
- Richardson, P. W.**, J. E. Bleacher, L. S. Glaze, & S. M. Baloga (2009). The Relationship Between Lava Fans and Tubes on Olympus Mons in the Tharsis Region, Mars. *Lunar and Planetary Science Conference Annual Meeting*
- Richardson, P. W.**, & E. Nesbitt (2009). Foraminifera Biofacies Map: A Tool for Monitoring the Health of the Puget Sound. *University of Washington Undergraduate Research Symposium*
- Richardson, P. W.** (2008). Small Volcanic Features on Olympus Mons in the Tharsis Region, Mars. *Undergraduate Student Research Program poster presentation at Goddard Space Flight Center*
- Richardson, P. W.**, & E. Nesbitt (2008). Evaluation of South Puget Sound Ecological Health through Microbiota Species Analysis. *University of Washington Undergraduate Research Symposium*