

Julia C. Carr

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Education

- 2022 **Ph.D. Geosciences**, *Penn State University*
Thesis: Rock strength and sediment controls on bedrock river incision in the Taiwan Central Range
- 2014 **Sc.B. Geology-Chemistry**, *Brown University*
Thesis: Fossilized Earthquakes: Microstructures of the Harbor Island, ME pseudotachylites

Work Experience

- 2022— **Postdoctoral Fellow**, *Simon Fraser University*
- 2017-22 **Graduate TA/RA**, *Penn State University*
- 2015-17 **GIS Technician**, Carnegie Museum of Natural History & Powdermill Nature Reserve
- 2014-15 **GIS Intern**, Pittsburgh Department of City Planning
- 2013-14 **Undergraduate Research and Teaching Assistant**, *Brown University*

Peer Reviewed Publications

- Li, W., Saletti, M., Hassan, M.A., Johnson, J.P.L., **Carr, J.C.**, Chui, C., Yang, K. (2023), The influence of coarse particle abundance and spatial distribution on sediment transport and cluster evolution in steep channels under sediment starved conditions, *Catena* <https://doi.org/10.1016/j.catena.2023.107199>
- Bagher, M, Sajjadi, P., **Carr J.**, La Femina, P., Klippel, A. (2020), Fostering Penetrative Thinking in Geosciences Through Immersive Experiences: a Case Study in Visualizing Earthquake Locations, *iLRN* doi: [10.23919/iLRN47897.2020.9155123](https://doi.org/10.23919/iLRN47897.2020.9155123)
- Zhao, J., La Femina, P., **Carr J.**, Sajjadi, P., Wallgrun, J.O., Klippel, A. (2020), Learning in the Field: Comparison of Desktop, Immersive Virtual Reality, and Actual Field Trips for Place-Based STEM Education, *IEEE Virtual Reality* doi: [10.1109/VR46266.2020.00114](https://doi.org/10.1109/VR46266.2020.00114)
- Carr, J.C.**, Snyder, J.B. (2018), Individual tree segmentation from a leaf-off photogrammetric point cloud, *International Journal of Remote Sensing*, doi: [0.1080/01431161.2018.1434330](https://doi.org/10.1080/01431161.2018.1434330)

In the works (preprint available on request)

- Carr, J.C.**, DiBiase, R.A., Yeh, EC, Fisher D.M., Kirby, E, Rock strength controls on orogen and reach scale variability in bedrock river morphology and sediment cover across the Taiwan Central Range (*in revision at Science Advances*)
- Carr, J.C.**, DiBiase, R.A., Erikson, CM**, Kohlman, CM**, Yeh, EC, The role of discharge, grain size, and bed structure on boulder mobility in Swallow Gorge, Taiwan (*in prep ~ 95%*)

Other Publications and Datasets

- Carr, J.C.**, Rock strength and sediment controls on bedrock river incision in the Taiwan Central Range (2022), Ph.D. dissertation, Penn State University, State College, Pennsylvania, USA.
- Carr, J.C.**, Neely, A.B., Del Vecchio, J., Greenberg, E., DiBiase, R.A. (2021). Steep Headwater-Colluvial Channels, Day Creek, San Gabriel Mountains CA, US. Distributed by OpenTopography. doi.org/10.5069/G9F47MBX
- Neely, A.B., Loucks, E., **Carr, J.C.**, Del Vecchio, J., Greenberg, E., and DiBiase, R.A. (2020). Bedrock cliffs in the San Gabriel and San Jacinto Mountains, California. Distributed by OpenTopography. <https://doi.org/10.5069/G96H4FKG>.
- Slyder, J.B., **Carr, J.C.**, Mercurio, M. (2017), [“Turning Adversity into Opportunity”](#), *ArcUser* 20(1): 16-19

Awards and Honors

Teaching

- 2021 **George Schenck Teaching Assistant of the Year**, *Penn State College of EMS*
- 2020 **Teaching Assistant Award**, *Penn State Geosciences*
- 2014 **Jan Tullis Undergraduate Teaching Award**, *Brown University*

Research Funding and Presentations

- 2021 **Graduate Student Colloquium 1st place PhD (post comps) talk | 2022 Deines Lecture**, *Penn State Geosciences*
- 2021 **Richard R. Parizek Graduate Fellowship**, *Penn State Geosciences*
- 2021 **Data Visualization Award & 2nd place Presentation in Physical Sciences and Mathematics**, Penn State Graduate Exhibition, University Libraries
- 2020 **Hiroshi and Koya Graduate Fellowship**, *Penn State Geosciences*
- 2020 **Alley Family Graduate Scholarship**, *Penn State Geosciences*
- 2019 **NASA Data Visualization & Storytelling Competition Grand Prize**, *AGU & NASA* ([link](#))
- 2019 **Chevron Scholarship**, *Penn State Geosciences*
- 2019 **Shell Geoscience Energy Research Facilitation Award**, *Penn State Geosciences*
- 2018 **NSF Graduate Fellowship Incentive Award**, *Penn State University*
- 2018 **Best Poster Award**, Binghamton Geomorphology Symposium
- 2018 **Scholten-Williams-Wright Scholarship in Field Geology**, *Penn State Geosciences*
- 2017 **FEGR (Funds for Excellence in Graduate Recruiting)**, *Penn State University*
- 2017 **NSF GRFP Honorable Mention**, *NSF*
- 2013 **Undergraduate Teaching and Research Award (UTRA)**, *Brown University*

Teaching (* Head TA)

- 2021* **Physical Geology (GEOSC 001)**, Head TA, *Penn State*
- 2020*, 21* **Virtual Field Investigations (GEOSC 497 Virtual field camp)**, Head TA, *Penn State*
- 2018, 19* **Field Geology (GEOSC 472a and GEOSC 472b—Field Camp)**, Head TA/TA, *Penn State University*, based in western US
- 2020 **Field Stratigraphy (GEOSC 572)**, TA, *Penn State University* (virtual due to COVID)
- 2019-20 **Virtual Reality Lab Development**, *Penn State University*
development of VR lab models for geosciences curriculum
- 2017, 18 **Introductory Field Geology (GEOSC 470)**, TA, *Penn State University*
- 2013, 14 **Structural Geology (GEOL 1450)**, TA, *Brown University*
- 2013 **Equilibrium, Rate, and Structure (CHEM 0330)**, TA, *Brown University*

Student Research Mentorship

Simon Fraser University

- 2023-24 Morgan Wright, *Post-Masters researcher*, projects: Modeling velocity-discharge relationships in the Fraser River
- 2023-24 Kyra Baird, *Senior Thesis*, project: Distribution and frequency of debris flows triggered by atmospheric rivers in the Fraser Canyon
- 2023-24 Chloe Ross, *Senior Thesis*, project: Quantifying sediment transport and bed cover variability in bedrock rivers using repeat multibeam bathymetry
- 2023 Sabir Sabor, *BCSCRIF tech*, project: Quantifying bedrock exposure along the Fraser River, British Columbia
- 2023 Rhea Tailor, *BCSCRIF tech*, project: Constraining topographic metrics for bedrock exposure along the Fraser River, British Columbia

Penn State University:

- 2021 Maya Kita, *NSF GEMT research assistant*, project: Quantifying structural controls on channel geometry across the Eastern Central Range, Taiwan
- 2020-21 Christian Erikson, *REU*, project: Quantifying spatiotemporal patterns of grain size, roughness, and flow resistance in the Liwu River, Taiwan
- 2020-21 Allison Clark, *Women in Science and Engineering (WISER)*, project: Quantifying grain mobility in the Xinwulu River, Taiwan
- 2019-20 M. Nazmi bin Yusri, *Senior Thesis*, project: Quantifying the impact of coarse sediment input from landslides and tributaries on river morphology in the Lele River, Taiwan
- 2019 Katie Kohlman, *WISER*, project: Relating grain size distribution and bed change to typhoon discharge in Swallow Gorge, Taiwan
- 2018 Tara Wu, *WISER*, project: Alluvial fans and debris flow mapping in Saline Valley, CA

Invited Presentations

- 2023 Rock properties govern bedrock river morphology across the Taiwan Central Range, *AGU Fall Meeting*
- 2022 Rock strength and sediment controls on feedbacks between tectonics and erosion, *Penn State Deines Lecture*
- 2021 Quantifying boulder mobility and bed change in steep bedrock rivers using repeat photogrammetric surveys, *Simon Fraser RDL lab*
- 2020 Quantifying changes in bed state and grain mobility in steep bedrock rivers through repeat UAV photogrammetry surveys, *AGU Fall Meeting*
- 2020 Orogen and reach scale patterns in rock strength, bedrock river morphology, and sediment cover across the Taiwan Central Range, *GSA Annual Meeting*
- 2020 Geomorphic and structural mapping of remote bedrock river corridors using kilometer scale UAV surveys, *UNAVCO GAGE/SAGE Special Interest Group*
- 2019 Quantifying the role of Rock strength and bed state on bedrock river incision in Taiwan, *Saint Francis University*
- 2016 What can drones and digital maps tell us about plants? A 21st century approach to ecology, *Pittsburgh Botanical Society*

Presentations (** indicates supervised student author)

11 pending abstracts for AGU Fall Meeting 2023, including 2 first author (1 invited), and 3 led by mentored students (1 post-masters, 2 undergraduate senior thesis)

- J.C. Carr**, E.G. Seagren, A.T. Steelquist, **C.B.A. Ross, **R. Taylor, E. Dingle, D. Heathfield, J.G. Venditti (2023), Valley architecture controls on hillslope-channel connectivity in the Fraser Canyon, *GSA #120-2* (talk)
- A.T Steelquist, EG Seagren, **JC Carr**, K. Baird, D. Heathfield, B. Menounos, IJ Larsen, E. Dingle, JG Venditti (2023), Distribution and characteristics of landslides in the Fraser River Corridor, Southwestern British Columbia, *EGU* (talk)
- J.G. Venditti & **Big Bar Landslide Research Team** (2023), Ecohazard posed by a rockslide that blocked salmon migration in the Fraser River, British Columbia, *EGU* (talk)
- J.C. Carr**, R.A. DiBiase, EC Yeh, D. M. Fisher, E. C. Kirby (2022), Rock strength controls on orogen and reach scale variability in bedrock river morphology and sediment cover across the Taiwan Central Range *AGU #EP16B-05* (talk)
- J.C. Carr**, R.A. DiBiase (2022), Data visualization challenges and opportunities for monitoring coarse sediment transport and bedrock channel geometry from high resolution models, *AGU #U12A-03* (invited talk)
- L. Youngquist, D.M. Fisher, R.A. DiBiase, **J.C. Carr**, EC Yeh, YC Tseng (2022), Exploring the relationship between surface processes, exhumation trajectories, and metamorphic fabrics in Taiwan *AGU #T32F-0247* (poster)
- **M. Kita, **J.C. Carr**, R.A. DiBiase (2022), Quantifying fluvial and structural controls on bedrock channel width in Taiwan, *NE GSA Meeting #11-3* (poster)

- JC Carr**, RA DiBiase, **CM Erikson, **CM Kohlman, E.C, Yeh (2021), Discharge, grain size, and bed structure controls on boulder mobility in Swallow Gorge, Taiwan, *AGU EP 33A-05* (talk)
- J.C. Carr**, R.A. DiBiase, E.C. Yeh (2020), Lithologic controls on orogen and reach scale variability in bedrock river morphology and sediment cover across the Taiwan Central Range, *AGU Fall Meeting #EP040-04* (talk)
- J.C. Carr**, R.A. DiBiase, **C.M. Erikson, **C.M. Kohlman (2020), Quantifying changes in bed state and grain mobility in steep bedrock rivers through repeat UAV photogrammetry surveys, *AGU #H086-0003* ([invited poster](#))
- **C.M. Erikson, **J.C. Carr**, R.A. DiBiase, **C.M. Kohlman (2020), Quantifying spatiotemporal patterns of grain size, roughness, and flow resistance in the Liwu River, Taiwan, *AGU Fall Meeting #EP038-0007* (poster)
- M. Bagher, P. Sajjadi, **J.C. Carr**, L. Leonard, P.C. La Femina, A. Klippel (2020), Visualizing Earthquake Locations in an Immersive Learning Environment, *AGU #SY047-13* (poster)
- JC Carr**, RA DiBiase, EC Yeh (2020), Orogen and reach scale patterns in rock strength, bedrock river morphology and sediment cover across the Taiwan Central Range, *GSA #144-1* ([invited talk](#))
- J.C. Carr**, R.A. DiBiase (2020), Geomorphic and structural mapping of remote bedrock river corridors using kilometer-scale UAV surveys. presented at GAGE/SAGE Virtual Special Interest Group Session: Emerging Applications for sUAS ([invited talk](#))
- J.C. Carr**, R. A. DiBiase, EC. Yeh (2019), Quantifying rock strength controls on bedrock river morphology in Taiwan with kilometer scale UAV surveys, *AGU #EP22A-07* (talk)
- P.C. La Femina, A. Klippel, **J.C. Carr**, J. Zhao, J.O Wallgrün, D. Oprean, SK Chang, K.L. Jackson (2019), Bringing the Field to the Classroom: Immersive Virtual Field Trips in Undergraduate Geoscience Courses, *AGU #ED53E-0885* (poster)
- J. Del Vecchio, C.L. Stanton, T.M. Ferland, G. Rossetto-Harris, **J.C. Carr**, P. Silverhart, A. Karp, B.D. Barnes, E. Stiles, BA. Eberle, J. Sclafani, E.A. Hajek (2019), Student-led organizations as a mechanism for improving department culture, *AGU #ED336-1056* (poster)
- J.C. Carr**, R. A. DiBiase, EC. Yeh (2019), Geomorphic and Structural Mapping for Remote Bedrock River Corridors in the Taiwan Central Range using paired outcrop and kilometer scale UAV surveys, *GSA annual meeting #72-2* (talk)
- D.M. Fisher, R.A. DiBiase, E. Kirby, **J. Carr**, EC Yeh (2019) Mountain belt dynamics, rock strength, and topography in Taiwan, *International Conference in Commemoration of 20th anniversary of the 1999 Chi-Chi Earthquake*
- J.C. Carr**, R. A. DiBiase, EC. Yeh (2019), Quantifying the role of rock strength on bedrock river morphology in Taiwan, *CLAST GSA Penrose Conference* (poster)
- J.C. Carr**, R. DiBiase, EC. Yeh (2018), High-resolution UAV surveys of bedrock rivers in Taiwan reveal connections between lithology, structure, and channel morphology, *AGU #T23A-3317* (poster)
- J. Del Vecchio, R. DiBiase, **J. C. Carr**, E. Greenberg, E. Hajek (2018), Stratigraphic controls on bedrock channel morphology in the Finger Lakes, New York, USA, *AGU #EP53E-2245*
- J. Zhao, J. Wallgruen, P. LaFemina, R. A. DiBiase, **J. C. Carr**, A. Klippel (2018), Toward a Universal Workbench for Visualization and Quantitative Exploration of Earth Science Data in Immersive Virtual Reality, *AGU #IN53B-04* (talk)

- J. Carr, R. DiBiase, EC. Yeh (2018), High-resolution UAV surveys of bedrock rivers in Taiwan reveal connections between lithology, structure, and channel morphology, *Binghamton Geomorphology Symposium* (poster)
- J. Carr, J. Snyder (2016), UAV Photogrammetry approach for above ground biomass in forest blowdowns, *AGU Fall Meeting #B51F-0477* (poster)
- J. Snyder, J. Carr (2016), From Toys to Tools: Drones Provide a Unique Perspective on Forest Ecology at Powdermill, *Carnegie Museum of Natural History* (talk)
- J. Carr, J. Snyder (2016), The Modern Natural History Museum: Exhibitions, Collections, and Research using GIS, *Pennsylvania GIS Conference* (talk)
- J. Snyder, J. Carr (2016), Seeing the Forest for the Trees, a UAV Perspective, *Pennsylvania GIS Conference* (talk)
- J. Carr, G. Hirth (2013), Fossilized Earthquakes: Microstructural Analysis of Harbor Island Pseudotachylites, *Summer Research Symposium*, Brown University, RI (poster)
- DJ Bain; MT Sikora; EP Wozniak; KR Fisher; J. Carr; EM Elliott (2011) Quantifying Urban Water Subsidies with Hydrological Tracers of Domestic Water, *AGU #H53J-1542* (poster)

Science Outreach

- 2019 **NASA Hyperwall Presentation**, “How do bedrock rivers transport coarse sediment?”, *AGU Data Visualization and Storytelling*, [video](#)
- 2018 **Sunday Nature and Science Lecture Speaker**, *Powdermill Nature Reserve*
- 2017 **Guest Lecturer**; Carnegie Mellon University, *History and Geography*
- 2017 **Elements Field Trip (invited)**; Developed and led field trip on local geology for Elements Workshop (*University of Pittsburgh & Carnegie Mellon University*)
- 2016 **Powdermill Nature Reserve Public Day**; Ran geocaching event for visitors
- 2016 **INECOL**; Assisted teaching GIS and field ecology in a week long course at Powdermill Nature Reserve to ecology and evolutionary biology students from the Instituto de Ecología out of Veracruz, Mexico

Service

Professional Service:

Convener:

- 2023 AGU Fall Meeting, “*Life and Landscapes Across Scales: How surface processes shape and are shaped by Ecology, Evolution, and Behavior*”
- 2022 AGU Fall Meeting, EP26: “*The Morphodynamic Trinity: Linkages among fluid flow, sediment transport, and morphology in fluvial systems across scales*”
- 2021 AGU Fall Meeting, EP41: “*The role and relevance of thresholds and variability across landscapes*”

Reviewer: JGR Earth Surface, Geophysical Research Letters, Geology, Earth Surface Dynamics

- 2023 **SZ4D Landscapes and Seascapes Committee**
- 2021 **AGU EPSP URGE** participant ([deliverables](#))

2017-22 **Association of Women Geoscientists (AWG)**. Penn State Mentor-Mentee program coordinator (2021-22), Co-president (2020-21), Webmaster & historian (2018-22)

Departmental Service:

2020 **Understanding Undergraduate Research in STEM Panel**, Penn State College of EMS Grad Student rep, targeted to the Millennium Scholars Program

2019 **First year field trip guide** (Pennsylvania, New York, Massachusetts), *Penn State*

2017, 18 **EMS Grad Student Panel**, panelist, hosted by EMS writing tutors, *Penn State*

2011-14 **Geology Departmental Undergraduate Group**, Leader, 2013-2014, *Brown University*

2010-14 **Brown Women's Rugby**, B-Side Scrum Captain (2011-2014)

2012-13 Matched Advising Program for Sophomores (MAPS), Mentor, *Brown University*

Certifications

2019 **Social and Behavioral Human Subjects Research (IRB)**

2019 **Mental Health First Aider**, National Council for Behavioral Health

2017, 19, 21 **Remote Pilot Certification**, Pilot #4020857, *FAA*