Shanti Bhattacharya Penprase *(she/her)*

Guarini Dean's Postdoctoral Fellow, Department of Earth Sciences, Dartmouth College
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EDUCATION

PhD, Earth & Environmental Sciences, University of Minnesota – Twin Cities, Minneapolis, MN **2024**
PhD Thesis: "*Sediment, Water, Change: Post-glacial to post-agricultural evolution of river systems in the Upper Mississippi River Valley"*
Advisor: Dr. Andrew Wickert

BA, Geology, Carleton College, Northfield, MN **2016**
Senior Thesis: "*Acid Mine Drainage Simulated Leaching Behavior of Goethite and Cobalt Substituted Goethite"*
Advisors: Dr. Bryn Kimball & Dr. Bereket Haileab

PROFESSIONAL EXPERIENCE

Guarini Dean's Postdoctoral Fellow, Department of Earth Sciences, Dartmouth College, Hanover, NH ***2024 – Present***

Research & Teaching Assistant, Earth & Environmental Sciences, University of Minnesota – Twin Cities, Minneapolis, MN ***2018 – 2024***

Watershed Monitoring Assistant, Mississippi Watershed Management Organization, Minneapolis, MN ***2017 – 2018***

Minnesota GreenCorps Member, Minnesota Pollution Control Agency, Saint Paul, MN ***2016 – 2017***

Keck Geology Research Fellowship, Carleton College, Northfield, MN ***2015 – 2016***

Mellon Mays Undergraduate Fellowship, Carleton College, Northfield, MN ***2015 – 2016***

PUBLICATIONS **Denotes Undergraduate Coauthor*

… **Penprase, S. B.,** Palucis, M., Getraer, A., *Jones, I., Strauss, J., Nordin, B., *Stewart, M., Cool Fans: climate-driven morphology and sediment transport processes of Arctic fans, Aklavik and Canyon Ranges, NWT, Canada. *JGR Earth Surface.* ***(In Prep)***

… **Penprase, S. B.,** Wickert, A., Larson, P. H., Rittenour, T. M., Riedesel, S., Faulkner, D. J., Romero, M., and Van Wyk De Vries, M., A natural experiment for base level change in alluvial river systems: post-glacial evolution of the Whitewater River, southeastern Minnesota. *Earth Surface Dynamics.* ***(In Prep)***

… McKenzie, M., King, T., Rothman-Haji, S., Nordgren, A., Blair, E., Schiavo, J., **Penprase, S. B.,** Venturelli, R., Miller, L., Evidence of changes in central Cordilleran ice stream sediment contribution and interactions with nearshore Pacific Ocean circulation throughout the Pleistocene. ***(In Prep)***

[7] **Penprase, S. B.,** *Wilwerding, A., McKenzie, M., Wickert, A., Larson, P., Rittenour, R., Meltwater, mud, and the Mississippi: Upper Mississippi River Valley slackwater sediments reveal shifting deglacial meltwater sources associated with the Marquette Readvance of the Laurentide Ice Sheet. *Climate of the Past.* Preprint: doi:10.5194/egusphere-2025-3920 ***(In Review, Preprint Available Online)***

[6] Romero, M., Van Wyk de Vries, M., Fedotova, A., Ito, E., Shapley, M., Magnani, M. B., Wickert, A. D, Jones, A. G, Marcott, S., Strelin, J., Brignone, G., **Penprase**, **S. B.,** and Caffee, M. W., Holocene Glacier fluctuations in Southern Patagonia documented by terrestrial and lacustrine records., *The Cryosphere.* ***(In Review)***

[5] **Penprase, S. B.,** Wickert, A., Larson, P., Wood. J., Larsen, I., Rittenour, T.**,** Plow vs. Ice Age: Erosion rate variability from glacial–interglacial climate change is an order of magnitude lower than agricultural erosion in the upper Mississippi River Valley. *Geology.* v. 53, p. 535–539, doi:10.1130/G52585.1. **(2025)**

[4] Prescott, J., Zoet, L., Hansen, D., Elmo, J., **Penprase, S. B.**, Controls on Glacial Kettle Morphology. *Earth Surface Processes and Landforms.* p. 1–10, doi: 10.1002/esp.6030, **(2024)**

[3] Wickert, A., Barnhart, K., Armstrong, W., Romero, M., Schulz, B., Ng, C., Sandell, C., La Frenierre, J., **Penprase, S. B.**, Van Wyk de Vries, M., MacGregor, K. Open-source automated ablation stakes to constrain temperature-index melt models. *Annals of Glaciology.* v. 64, p. 425–438, doi:10.1017/aog.2024.21, **(2024)**

[2] Romero, M., **Penprase, S. B.**, Van Wyk de Vries, M. S., Wickert, A. D., Jones, A. G., Marcott, S. A., Strelin, J. A., Martini, M. A., Rittenour, T. M., Brignone, G., Shapley, M. D., Ito, E., MacGregor, K. R., and Caffee, M. W.: Late Quaternary glacial maxima in southern Patagonia: insights from the Lago Argentino glacier lobe, *Climate of the Past,* 20, 1861–1883, doi.org/10.5194/cp-20-1861-2024, **(2024)**

[1] Van Wyk De Vries, M., Romero, M., **Penprase, S. B.**, Ng, G. -H. C., and Wickert, A. D., 2023, Increasing rate of 21st century volume loss of the Patagonian Icefields measured from proglacial river discharge: *Journal of Glaciology*, p. 1–16. doi:10.1017/jog.2023.9. **(2023); Shortlisted for the Graham Cogley Award, International Glaciological Society.**

FELLOWSHIPS AND GRANTS

Approx. $175,000 total funds raised in competitive selection processes

- **Guarani Dean's Postdoctoral Fellowship,** *Dartmouth College* ***2024-2026***
  $140,000 in stipend and research support
- **V. Murthy & Noruk Fellowship for Women,** *Earth & Environmental Sciences, University of Minnesota* ***2023***
  $6,000 in stipend support
- **Junior F. Hayden Fellowship,** *Earth & Environmental Sciences, University of Minnesota* ***2022***
  $3,000 in stipend support
- **AGeS2 Geochronology Award,** *National Science Foundation Funded Grant Program* ***2021***
  $10,000 to support independently developed geochronology and geochemistry research
- **John W. Gruner Fellowship,** *Earth & Environmental Sciences, University of Minnesota* ***2021***
  $6,000 in stipend support
- **Warren E. Fisher Fellowship,** *Earth & Environmental Sciences, University of Minnesota* ***2020***
  $3,000 in stipend support
- **Richard C. Dennis Fellowship,** *Earth & Environmental Sciences, University of Minnesota* ***2019***
  $6,000 in stipend support

AWARDS

- **Alvin Anderson Award,** *Saint Anthony Falls Laboratory, University of Minnesota* ***2023***
  For excellence in research related to water resources and sediment transport, ***$2500 in student support***
- **H.E. Wright Footsteps Award,** *Earth & Environmental Sciences, University of Minnesota* ***2023***
  For outstanding students conducting research in Quaternary studies or related fields
- **Outstanding Teaching Assistant Award,** *Earth & Environmental Sciences, University of Minnesota* ***2023***
- **Outstanding Student Presentation Award (OSPA),** *American Geophysical Union (AGU)* ***2022***
- **Best Oral Presentation Award**, *EARTH Student Research Symposium, University of Minnesota* ***2022***
- **Thank a Teacher Award,** *University of Minnesota* ***2019***
  Student-nominated award for "educators that make a difference in student education"
- **Honorable Mention,** *Graduate Research Fellowship Program, National Science Foundation* ***2019***
- **Keck Geology Consortium Fellowship,** *Keck Geology Consortium* ***2016***
- **Mellon Mays Undergraduate Fellowship,** *Mellon Mays Foundation* ***2015***

TEACHING

- **Earth and Planetary Surface Processes,** *Dartmouth College,* ***(Instructor of Record)*** ***Spring 2026***
  Lab course with emphasis on GIS applications of remotely sensed datasets using ArcGIS and QGIS
- **Paleoclimate and Glacial Processes, "The Stretch" Field Course,** *Dartmouth College,* ***Fall 2025***
  (*Co-Instructor with Prof. Meredith Kelly)*
  Three-week course section on paleoclimatic evolution of the Eastern Sierra Mountains, CA

GUEST TEACHING

- **Geomorphology,** *Denison University* ***April 2024***
  In-class activity on shallow subsurface hydrology and the impacts of urbanization and land use change on stormwater discharge
- **Isotope Geochemistry**, *University of Minnesota* ***November 2023***
  Lecture on applications of geochronology to deglaciation and the impacts of glacial melting on river systems
- **Surface & Groundwater Hydrology,** *Macalester College* ***February 2024, February 2022, & March 2021***
  Two course sessions and a lab focused on water quality and state-level environmental legislation in Minnesota, incorporating an in-class activity, lecture and facilitated class discussion
- **Geomorphology,** *University of Minnesota* ***October 2020***
  Four lectures and original assignments on glacial processes, deglaciation, and paraglacial environments
- **Advanced Geomorphology,** *Macalester College* ***March 2020***
  Geomorphology and geochronology lecture, activity, and facilitated class discussion

TEACHING ASSISTANTSHIPS

- **Geomorphology,** *University of Minnesota* ***Fall 2022*** *(In-Person)* & ***Fall 2020*** *(Online)*
- **Hydrogeology Field Camp,** *University of Minnesota* ***Summer 2022*** *(In-Person)* & ***Summer 2021*** *(Online)*
- **Earth Surface Processes,** *University of Minnesota* ***Spring 2021*** *(Online)*
- **Earth & Its Environments,** *University of Minnesota* ***Summer 2019, Fall 2019 & Fall 2018*** *(In-Person)*
- **Introduction to Geology,** *Carleton College* ***Fall 2015*** *(In-Person)*

UNDERGRADUATE MENTORING **Student from group(s) historically underrepresented in geosciences*

Lang Burgess – *Dartmouth College,* **Directed Undergraduate Research Project** ***2025 – Present***
Laboratory experiments and structure from motion photogrammetry to study kettle lake formation processes

Laura Wilson – *Dartmouth College,* **Directed Undergraduate Research Project** ***Spring 2025***
Laboratory experiments and structure from motion photogrammetry to study kettle lake formation processes

Abigail Wilwerding –** *University of Minnesota,* **Directed Undergraduate Research Project** ***2022 – 2024
X-Ray Fluorescence analysis and sediment core descriptions; ***Student poster presentation at a Regional Geological Society of America meeting and undergraduate co-authorship on peer-reviewed publication***

Anna Gonzalez –** *University of Minnesota,* **Directed Undergraduate Research Project** ***2022 – 2023
Statistical analysis of riverbed grain size distribution in the Whitewater River catchment

Hana Uyeda –** *Carleton College,* **Senior Thesis Advisor** ***2021 – 2022
Case studies on environmental impacts of Line 3 Pipeline in Minnesota and Michigan

Campbell Dunn –** *University of Wisconsin,* **Research Collaborator & Mentor** ***2021 – 2022

Peter Mitchell – *University of Minnesota,* **Honors Thesis Committee & Collaborator** ***2020 – 2021***

Jesse Schewe – *University of Minnesota,* **Fieldwork Supervisor** ***Summer 2021***

MEDIA

Science.org, ***"Modern farming has carved away earth faster than during the ice age"*** ***2025***
Howell, E., doi: 10.1126/science.zycg3qb

Carleton College, ***"Research by Shanti Penprase '16 featured in Science news story"*** ***2025***
https://www.carleton.edu/news/stories/research-shanti-penprase-science-story/

British Society for Geomorphology, "*Quarterly Newsletter Research Feature"* ***2025***
https://www.geomorphology.org.uk/2025/06/25/newsletter-june-2025/

AGU Earth & Planetary Surface Processes Section, ***"Early Career Spotlight"*** ***2022***
https://connect.agu.org/epsp/spotlight/feb-2022/

INVITED PRESENTATIONS

Sedimentary Records of Holocene Climate and Environmental Change, ***AGU Fall Meeting,*** Invited Talk ***Fall 2025***
Upper Mississippi River Valley tributary slackwater sediments reveal shifting deglacial meltwater sources associated with the Marquette Readvance of the Laurentide Ice Sheet

Soft Rock Seminar, ***University of Texas Austin,*** Invited Speaker ***Spring 2025***
Sediment, Water, Change: Post-glacial to post-agricultural evolution of river systems in the Upper Mississippi River Valley

Ronneberg Lecture, ***Denison University,*** Invited Speaker ***Spring 2024***
Axe vs Ice Age: Contextualizing the impacts of Euro-American Agriculture and paleoenvironmental change on catchment averaged erosion rates from the Last Glacial Maximum to the post-settlement period in southeastern Minnesota, USA

Earth & Planetary Surface Processes General Contributions, ***AGU Fall Meeting,*** Invited Presenter ***Fall 2022***
Using Paired Optically Stimulated Luminescence and Cosmogenic Nuclide ^{10}Be Dating to Understand Changes in Erosion Rate within a Fill–Cut Terrace Sequence: Whitewater River, Southeastern Minnesota, USA

Beyond the Lab Speaker Series, ***Saint Anthony Falls Laboratory,*** Panel Moderator ***Fall 2022***
The Ghost Valley: Human Impacts on the Whitewater River Valley, southeastern Minnesota, Panel Discussion

Carleton College Geology Seminars, Departmental Seminar Speaker ***Spring 2022***
Linking river profile, base level change, and glaciation across timescales: Whitewater River, Southeastern Minnesota

Source-to-Sink Webinar Series, Co-Presenter ***Spring 2022***
Waves of ice-sheet-mediated aggradation and incision transform upper Mississippi valley networks

Minnesota Geological Survey, Invited Speaker ***Spring 2021***
Building coding tools to constrain fluvial response to glaciation in southeastern Minnesota

American Institute of Professional Geologists, Minnesota Section, Invited Speaker ***Spring 2021***
Impacts of Glaciation on River Profile Morphology and Evolution

SELECTED CONFERENCE ABSTRACTS **Denotes Undergraduate Advisee*

[13] **Penprase, S. B.,** Wilwerding, A., Wickert, A. D., McKenzie, M., Larson, P., & Rittenour, T. M. *Upper Mississippi River Valley tributary slackwater sediments reveal shifting deglacial meltwater sources associated with the Marquette Readvance of the Laurentide Ice Sheet.* ***Invited.*** American Geophysical Union 2025, New Orleans, LA, USA. PP028: Sedimentary records of Holocene climate and environmental change.

[12] **Penprase, S. B.,** Jones, I., Getraer, A., Nordin, B., Stewart, M., Strauss, J. V., Palucis, M., *Cool fans: Morphology and sediment transport processes of Arctic fans, Aklavik and Canyon Ranges, NWT, Canada.* American

Geophysical Union 2025, New Orleans, LA, USA. From Permafrost to Glaciers: Evolution of ice-influenced landscapes.

[11] **Penprase, S. B.,** Wilwerding, A., McKenzie, M., Wickert, A., Larson, P., Rittenour, R., *Slackwater sediments reveal time-variable glacial meltwater routing down the Upper Mississippi River at the Younger Dryas–Holocene transition*. American Geophysical Union Annual Meeting, Washington D.C, December 9–13, 2024.

[10] **Penprase, S. B.**, Wickert, A., Larson, P., Larsen, I. J., Rittenour, T., Faulkner, D., Running, G. (2023) *Using Paired Optically Stimulated Luminescence and Cosmogenic Nuclide ^{10}Be Dating to Understand Changes in Erosion Rate within a Fill–Cut Terrace Sequence: Whitewater River, Southeastern Minnesota, USA.* Abstract (talk), presented at 2023 Fall Meeting, American Geophysical Union, San Francisco, CA, 11-15 Dec.

[9] *Wilwerding, A., **Penprase, S. B.**, and Wickert, A., 2024, Unraveling Early Holocene Glaciofluvial activity in the upper Mississippi Valley, USA: Insights from slackwater deposits in the Whitewater River Region, *in* GSA, https://gsa.confex.com/gsa/2024NC/webprogram/Paper399004.html.

[8] **Penprase, S. B.,** Wickert, A., Larson, P., Larsen, I. J., Rittenour, T., Faulkner, D., Running, G. (2022*) Using Paired Optically Stimulated Luminescence and Cosmogenic Nuclide ^{10}Be Dating to Understand Changes in Erosion Rate within a Fill–Cut Terrace Sequence: Whitewater River, Southeastern Minnesota, USA.* ***Invited.*** Abstract (poster), 2022 Fall Meeting, American Geophysical Union, Chicago, IL. 12-16 Dec.

[7] **Penprase, S. B.,** Wickert, A., Larson, P., Faulkner, D., Barefoot, E., Wood, J., Jones, J., *Dunn, C., Larsen, I., Rittenour, T., and Running, G. (2022) *Impacts of Changing Climate and Glacially Driven Base Level on an Upper Mississippi River Tributary During the Most Recent Glacial–post-Glacial Transition.* Abstract (poster), 2022 Fall Meeting, American Geophysical Union, Chicago, IL. 12-16 Dec.

[6] **Penprase, S. B.,** Wickert, A., Larson, P., *Dunn, C., Bezada, M., Running, G., Faulkner, D., Jones, J., *Schewe, J. (2021) *Characterizing River Profile, Concavity, and Sediment Discharge Response to Changes in Base Level across Timescales: Whitewater River, Southeastern Minnesota, USA.* Abstract EP 45C-1533 (poster), presented at 2021 Fall Meeting, American Geophysical Union, New Orleans, LA. 13-17 Dec.

[5] **Penprase, S. B.,** Wickert, A. D, Clubb, F. J. (2020) *Signatures of glaciation on river channel long profiles: changes in slope and concavity.* Abstract EP012-0025 (poster), presented at 2020 Fall Meeting, American Geophysical Union, Virtual, 1-17 Dec.

[4] Romero, M., **Penprase, S. B.,** Van Wyk De Vries, M. S., Wickert, A. D. MacGregor, K. R., Brignone, G., Martini, M., Strelin, J. A. (2020) *Geomorphological Expression of the Last Glacial Maximum (LGM) in Lago Argentino, Southern Patagonian Icefield.* Abstract EP029-0005 (poster), presented at 2020 Fall Meeting, American Geophysical Union, Virtual, 1-17 Dec.

[3] **Penprase, S. B.,** Wickert, A. D., Larson, P., Clubb, F. J., Kurak, E. (2019) *Isolating climatic and glacial impacts on river morphology: a paired-catchment study in the upper Mississippi River watershed.* Abstract EP53I-2253 (poster), presented at 2019 Fall Meeting, American Geophysical Union, San Francisco, CA, 9-13 Dec.

[2] **Penprase, S. B.,** Kimball, B. E. (2015) *Acid mine drainage simulated leaching behavior of goethite and cobalt substituted goethite.* Abstract GC51F-1147 (poster), presented at 2015 Fall Meeting, American Geophysical Union, San Francisco, 14-18 Dec.

[1] **Penprase, S. B.,** Abramson, N., LaSharr, K., Chorover, J. (2014) *The effects of rock type and landscape position on solution chemistry of soils in the Biosphere 2 Desert Site of the Santa Catalina Mountains Critical Zone Observatory.* Abstract EP23B-3597 (poster), presented at 2014 Fall Meeting, American Geophysical Union, San Francisco, 15-19 Dec.

SERVICE AND OUTREACH

- **Ad hoc Reviewer,** *Water, Landscape, and Critical Zone Processes (WalCZ), National Science Foundation* ***Spring 2025***
- ***From Permafrost to Glaciers: Evolution of ice-influenced landscapes*****,** **Convener,** *American Geophysical Union Annual Meeting* ***2025***
- ***Landscape Evolution Beneath & Beyond the Ice*****,** **Convener,** *American Geophysical Union Annual Meeting* ***2022 – 2024***

- **Advancing Geochronology Science, Spaces, and Systems, Steering Committee** ***2022 – 2024***
- **Earth & Planetary Surface Processes, Student Committee,** *American Geophysical Union* ***2022 – 2024***
- **Girls Inc. Outreach Event on Landscape Evolution with 8th Grade Students,** *Eureka! Program* ***Summer 2023***
- **Association of Women Geoscientists (AWG): Minnesota Chapter, Board Member** ***2020 – 2024***
- **Incoming Graduate Student Mentoring Program, Founder**, *ESCI, University of Minnesota* ***2020 – 2023***
- **Sedimentary Systems Faculty Search Committee, Member,** *University of Minnesota* ***2021 – 2022***
- **Women in Science and Engineering (WISE), Mentor,** *University of Minnesota* ***2020 – 2021***
- **EARTH Student Research Symposium, Planning Committee,** *University of Minnesota* ***2019 – 2021***

LABORATORY EXPERIENCE AND PROFESSIONAL DEVELOPMENT

Wilderness Advanced First Aid (WAFA), *NOLS Global Wilderness School* ***2024–Present***

PaleoCAMP, *Paleoclimate Modeling and Fieldwork Short Course* ***2024***

^{10}Be Cosmogenic Nuclide Dating, *Field & Lab (Supported by AGeS2 Award)* ***2022***
University of Massachusetts Amherst, *Collaborator: Dr. Isaac Larsen*

Optically Stimulated Luminescence Dating, *Field & Lab* ***2021, 2019***
Utah State University, *Collaborator: Dr. Tammy Rittenour*

Geoprobe Sediment Core Processing & Description, *Field & Lab* ***2021 – 2024***
University of Minnesota

Teaching Certificate*, Preparing Future Faculty Program* ***2021***
Center for Educational Innovation, University of Minnesota

SELECTED COMPUTATIONAL APPROACHES

- QGIS, ArcGIS Pro, GRASS GIS
- Python, R, UNIX, MATLAB, Git
- Structure from Motion (SfM) photogrammetry, LiDAR, remote sensing, drone imagery

SELECTED FIELD EXPERIENCE

- Alluvial Fan Field Mapping and Paleoclimate Lake Bathymetry, **Northwest Territories, Canada,** *One field season*
- Glacial–Post-Glacial Transition, **Minnesota, USA**, *Three field seasons*
- Hydrogeology Field Camp, **Minnesota, USA**, *One field season + One online field season*
- Glacial Isostatic Adjustment, **Southern Patagonian Icefield, Argentina** , *One field season*
- Field Camp, Carleton College Geology Department, **New Zealand**, *One field season*

PROFESSIONAL AFFILIATIONS

- Asian Americans and Pacific Islanders in Geosciences (AAPIiG)
- Association of Women Geoscientists (AWG)
- Earth Science Women's Network (ESWN)
- American Quaternary Association (AMQUA)
- American Geophysical Union (AGU)
- Geological Society of America (GSA)