

Marianne Cowherd, Ph.D.

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APPOINTMENTS

Assistant Professor , Department of Earth Sciences Montana State University	2025 – present Bozeman, MT
Affiliate Researcher , Earth and Environmental Sciences Area Lawrence Berkeley National Laboratory	2023 – present Berkeley, CA
Affiliate Researcher Central Sierra Snow Laboratory	2022 – present Soda Springs, CA
Visiting Scientist , Earth Systems Analysis & Modeling Pacific Northwest National Laboratory	2022 Richland, WA
US Department of Energy Computational Sciences Graduate Fellow University of California, Berkeley	2021 – 2025 Berkeley, CA

EDUCATION

Ph.D. , Environmental Science, Policy, and Management University of California, Berkeley	2025
M.S. , Environmental Engineering Stanford University	2020
B.S. with honors, Environmental Systems Engineering Stanford University	2019

PEER-REVIEWED JOURNAL PUBLICATIONS

student, *equal contribution

9. Marshall, A., **Cowherd, M.**, Rahimi, S., & Ye, Y. The 2026 western U.S. snow drought was about four times more likely due to climate change. *Proceedings of the National Academy of Sciences*, 2026. <https://doi.org/10.1073/pnas.2612961123>
8. Gibson, L., **Cowherd, M.**, Aiken, A., Rudisill, W., Riihimaki, L., & Feldman, D. The dual role of snowfall in impacting surface albedo and spring snowmelt in the Upper Colorado River Basin. *npj Climate and Atmospheric Science*, 2026. <https://doi.org/10.1038/s41612-026-01446-0>
7. Schwartz, A., **Cowherd, M.**, McGurk, B., Mason, M., Riker-Coleman, K., Zutter, B., & Lewis, G. Modernization of the Central Sierra Snow Laboratory: A new chapter in a storied existence. *Bulletin of the American Meteorological Society*, 2026. <https://doi.org/10.1175/BAMS-D-25-0112.1>
6. **Cowherd, M.**, Schwartz, A., Marks, J., Brandt, G., Kim, L., Collins, B., Stephens, S., & Giroto, M. Vegetation and topographic controls on post-fire snowpack: Evidence from the 2021 Caldor Fire. *Ecohydrology*, 2026. <https://doi.org/10.1002/eco.70235>
5. **Cowherd, M.**, Mital, U., Rahimi, S., Giroto, M., Schwartz, A., & Feldman, D. Climate change-resilient snowpack estimation in the Western United States. *Communications Earth & Environment*, 2024. <https://doi.org/10.1038/s43247-024-01496-3>

4. Giroto, M., Formetta, G., Azimi, S., Bachand, C., **Cowherd, M.**, De Lannoy, G., Lievens, H., Modanesi, S., Raleigh, M.S., Rigon, R., & Massari, C. Identifying snowfall elevation gradients by assimilating satellite-based snow depth observations. *Science of the Total Environment*, 2024. <https://doi.org/10.1016/j.scitotenv.2023.167312>
3. **Cowherd, M.**, Leung, L.R., & Giroto, M. Evolution of global snow drought characteristics from 1850 to 2100. *Environmental Research Letters*, 2023. <https://doi.org/10.1088/1748-9326/acd804>
2. **Cowherd, M.**, Egan, G., Fringer, O., & Monismith, S. Wave phase-decomposed velocity profile observations in a shallow estuary. *Geophysical Research Letters*, 2021. <https://doi.org/10.1029/2020GL092251>
1. Egan, G., **Cowherd, M.**, Fringer, O., & Monismith, S. Observations of near-bed shear stress in a shallow, wave- and current-driven flow. *Journal of Geophysical Research: Oceans*, 2019. <https://doi.org/10.1029/2019JC015165>

Submitted:

Cowherd, M., Rahimi, S., Vargas Zeppetello, L., Hall, A., and Giroto, M. Surface and atmosphere drivers of snow drought are topography-dependent. *in review*

Lasko, K., Pan, C., Griffin, S., Meehan, T., Pickens, A., **Cowherd, M.**, and Sproles, E.A. Shadow detection approaches substantially underestimate tree and terrain shadows in Sentinel-2 satellite imagery across Northern Europe. *in review*

Bose, D., Ivanovich, C., Raymond, C., Benmarhnia, T., Hoteit, I., **Cowherd, M.**, Nazemi, N., and Tuholske, C. Humid-heat extremes and stickiness in future climates of the Arabian Peninsula. *submitted*

FUNDED EXTERNAL PROPOSALS

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|-----------|---|
| 2026–2027 | DOE-Genesis (DE-FOA-0003612), Co-I. ASPIRE: ARM-driven Simulation for Physical Insight Research Engine. <i>Total: \$750,000; MSU: \$40,000</i> |
| 2027 | USGS (104b), PI. Direct observation of energy and mass fluxes over snow. <i>\$25,000</i> |

GRANTS AND AWARDS

New Faculty Graduate Research Assistant Grant	2026
New Faculty Equipment Grant	2026
NSF-EAR Postdoctoral Fellowship (declined)	2025-2027
ELLIIT Machine Learning for Climate Science visiting scholar, Sweden	2024
Alpine Avalanche Rescue Foundation Training Scholarship	2024
UC Berkeley Graduate Division Conference Travel Grant	2024 (x2)
Peder Sather Grant (Co-I)	2023-2025
H2H8 Undergraduate Support Grant	2023
H2H8 Graduate Student Explorer Grant	2022
NCAR University Small Request	2022-2025
US Department of Energy Computational Science Graduate Fellowship	2021-2025
UC Berkeley Sponsored Programs for Undergraduate Research	2021-2023
UC Berkeley Forestry Research Summer Award	2021
UC Berkeley Undergraduate Mentoring Fellowship	2021
UC Berkeley Graduate Remote Instruction Innovation Fellowship	2020-2021
UC Berkeley ESPM Starter Grant	2020
UC Berkeley STEM*FYI Technology Grant	2020
NSF GRFP honorable mention	2019
Stanford Undergraduate Conference Grant	2019
Stanford Undergraduate Summer Research Fellowship	2018
Stanford Woods Institute Forum for Undergraduate Environmental Leadership	2018

INVITED SEMINARS

2026, Jan	Western US hydroclimate research group, online
2025, Aug	S3 wind and atmospheric boundary layer research group, online
2025, Apr	Berkeley Atmospheric Sciences Center Seminar, University of California, Berkeley
2025, Feb	Earth Sciences Seminar, Montana State University
2024, Nov	California Cooperative Snow Surveys Meeting, Auburn, California
2024, Oct	Machine Learning for Climate Science Series, Linköping University, Sweden
2024, Sep	GeoHyd Seminar, University of Oslo, Norway
2023, Nov	Outer Coast, Sitka, Alaska
2022, Sep	Satellite Data for Hydrological Applications Seminar, virtual

CONFERENCES

21. **Cowherd, M.**, Rahimi, S., Vargas Zeppetello, L., Giroto, M., “Climate-driven snow drought trends are topography-dependent.” Snow Hydrology, Jaca, Spain, February 2026. (talk)
20. Yu, Felix., Feldman, D., **Cowherd, M.** et al. “Trojan Horse Snowfall: How dust in snowfall produces delayed, but significant impacts across the Upper Colorado River Basin.” American Geophysical Union, New Orleans, LA, December 2025. (poster)
19. **Cowherd, M.**, et al. “Quantifying snow information in a changing climate.” American Geophysical Union, New Orleans, LA, December 2025. (poster)

18. **Cowherd, M.**, Gutmann, E., and Feldman, D., “Snow bedforms observed with terrestrial scanning lidar.” Joint ARM User Facility and ASR PI Meeting, Rockville, MD, March 2025. (poster)
17. **Cowherd, M.**, Gibson, L., Feldman, D., Aiken, A., Riihimaki, L., Telg, H., Hodshire, A., Levin, E., and McMeeking, G., “Inferring wet deposition (of dust).” Joint ARM User Facility and ASR PI Meeting, Rockville, MD, March 2025. (talk)
16. **Cowherd, M.**, Mital, U., Rahimi, S., Giroto, M., Schwartz, A., and Feldman, D., “Climate-resilient snowpack estimation: measurements and models in a changed future.” American Geophysical Union, Washington, D.C., December 2024. (invited talk)
15. **Cowherd, M.**, Gutmann, E., Kochanski, K., and Feldman, D., “Snow bedforms observed with terrestrial scanning lidar.” American Geophysical Union, Washington, D.C., December 2024 (poster)
14. Surunis, A. et al. incl. **Cowherd, M.**, “NASA SnowEx Snow Albedo Campaign 2023: A Collaborative Effort to Improve Snow Observations in the Boreal Forest Over Scales of Space and Time” American Geophysical Union, Washington, D.C., December 2024 (talk)
13. Gibson, L., Aiken, A., **Cowherd, M.**, and Feldman, D. “The curious case of invisible dust in snowfall and snowpack in the Upper Colorado River Basin” American Geophysical Union, Washington, D.C., December 2024 (poster)
12. **Cowherd, M.**, Mital, U., Rahimi, S., Giroto, M., Schwartz, A., and Feldman, D., “Climate-resilient snowpack estimation with machine learning.” NCAR-CISL International Computing in the Atmospheric Sciences Symposium, Stresa, Italy, September 2024. (talk)
11. **Cowherd, M.**, Schwartz, A., Marks, J., Brandt, G., Kim, L., Collins, B., Stephens, S., and Giroto, M., “Post-fire accumulation and melt in the Caldor Fire.” Western Snow Conference, Corvallis, OR, April 2024. (talk)
10. **Cowherd, M.**, Rahimi, S., Giroto, M., “Predicting spatio-temporal distribution of snow droughts using dynamically downscaled, high resolutions climate models.” American Geophysical Union, San Francisco, CA, December 2023. (poster)
9. **Cowherd, M.**, Mital, U., Rahimi, S., Duan, S., Giroto, M., and Feldman, D., “Future changes in Western US snow distribution predictability: the case for using multi-modal observations within artificial intelligence models.” American Geophysical Union, San Francisco, CA, December 2023. (poster)
8. **Cowherd, M.**, Gutmann, E., and Feldman, D., “What can we learn about snow bedforms from lidar scans at Kettle Ponds?” S3 Science Workshop, Boulder, CO, November 2023. (talk)
7. **Cowherd, M.**, Reed, C.J., Duan, S., Rahimi, S., Mital, U., Giroto, M., and Feldman, D., “ML for climate-change resilient snowpack estimation in the Western United States.” HydroML Symposium, Berkeley, CA, May 2023. (breakout talk)
6. **Cowherd, M.**, Leung, L.R., and Giroto, M., “Snow droughts in E3SM.” American Geophysical Union, Chicago, IL, December 2022. (poster)
5. **Cowherd, M.**, Trujillo, E., and Giroto, M., “Snow-wildland fire feedbacks in the Sierra Nevada.” Western Snow Conference, Salt Lake City, UT, April 2022. (poster)
4. **Cowherd, M.** and Giroto, M., “Snow-productivity relationships in the fire-impacted Sierra Nevada.” American Geophysical Union, New Orleans, LA, December 2021. (talk)
3. **Cowherd, M.**, Baldocchi, D., and Giroto, M., “Energy flux over snow during melt season.” Amer-iFlux Annual Meeting, September 2021. (poster)

2. Egan, G., **Cowherd, M.**, et al., “Cohesive Sediment Erosion in a Shallow, Wave-and Current-driven Flow.” Ocean Sciences Meeting, San Diego, CA, February 2020. (poster)
1. **Cowherd, M.**, Egan, G., Monismith, S. G., and Fringer, O., “Wave phase-decomposed near-bed currents and turbulence on the shoals of South San Francisco Bay.” Ocean Sciences Meeting, San Diego, CA, February 2020. (poster)

TEACHING

Montana State University

ERTH 551: Snow Science Seminar	F 2026
ERTH 291: Snow and Ice	S 2026
ERTH 303: Weather and Climate	F 2025, S 2026

Field Courses

CUAHSI/SINTER Snow Measurements Field School	2025
Central Sierra Snow Lab Snow Science School	2025

University of California, Berkeley graduate student instructor: Comunicando Ciencias Ambientales y de la Salud (F 2022); Earth System Remote Sensing (S 2021); Intro. to Environmental Sciences (F 2020); **Outer Coast** seminar advisor: Indigenizing Futures (Su 2020); **Stanford University** course assistant: Intro. to Earth Systems (F 2019), Intro. to Environmental Systems Engineering (S 2019)

MENTORING

Montana State University

Graduate:

Daniel Bose (PhD, committee, 2025–)
 Briana Whitehead (PhD, committee, 2025–)
 Anna Verhaeghe (MS, chair, 2026–)
 Jeremy Wood (MS, committee, 2026–)
 Kenadie Mortensen (MS, committee, 2026–)

Undergraduate:

Margaret Friese (USP Honors 2025–)

University of California, Berkeley

Lee Kim (forestry, 2023-2025), Shashwath Senthil (computer science, 2023-2025), Mia Jones (CSSL instrumentation, 2024), Gisele Brandt (forestry, 2023-2024), Evan Robert (computer science, H2H8 fellow 2023-2024), Julia Marks (forestry, 2022-2023), Sarah Zhang (SPUR student, 2021-2023, Babcock Prize in Environmental Science), Jieyuan Kan (SURF fellow, 2021), Hayden Street (thesis, 2020-2021)

PROFESSIONAL AFFILIATIONS

American Avalanche Association, American Geophysical Union, American Water Resources Association Montana Chapter, Earth Science Women’s Network, European Geosciences Union

SELECTED PRESS COVERAGE

Grist, Inside Climate News	2026
DEIXIS Magazine, KQED Radio, The Daily Californian	2025
KCRA3 News Sacramento, DOE Office of Science	2024

OUTREACH

Montana Climate Week x Protect Our Winters, panelist	2026
AGU Cryosphere Section, CryoCoffee mentor	2025
Invited career speaker, miRcore Computational Biology Camp, Ann Arbor, MI	2025
Senior thesis mentor, BASIS Independent High School, Fremont, CA	2023-2025
Presenter, Black Pine Circle 5th grade science slam, Berkeley, CA	2023

SERVICE

Peer Review:	<i>Atmospheric Research, Communications Earth & Environment, Environmental Research Communications, Environmental Research Letters, Geophysical Model Development, Geophysical Research Letters, Journal of Climate, Journal of Hydrology, Machine Learning: Earth, Natural Hazards and Earth System Science, Nature Climate Change, Nature Communications, Nature Reviews Earth & Environment, npj Climate and Atmospheric Science, The Cryosphere, Water Resources Research; N_≈40</i>
Proposal:	Climate Change AI Innovation Grants (2024)
Conference:	Session chair, Western Snow Conference, Denver, CO (2026) Organizer, CryoDA Workshop, Oslo, Norway (2025) Session chair, HydroML, Berkeley, CA (2023)
University:	Earth Sciences Curriculum Committee (2025–) Faculty search committee (2024) Graduate admissions committee (2023) Chancellor's Advisory Committee on Sustainability & Climate Change (2022-2023) Faculty Senate Diversity, Equity, and Campus Climate Committee (2021-2022) Berkeley Graduate Assembly Representative (2021-2023) ESPM Mentoring Faculty Working Group (2020-2021)

PROFESSIONAL DEVELOPMENT

Strategic Applications & Grants Excellence Series	2026
Gallatin National Forest Avalanche Center Professional Development Workshop	2026
INTERSECT Research Software Engineering Bootcamp	2024
USDA Secure Water Futures Expedition	2024
EGU Snow Science Winter School	2023
NASA Snowmachine Safety Training	2023
UC Berkeley Certificate of Teaching and Learning in Higher Education	2021
UNAVCO InSAR Short Course	2021
SnowEx HackWeek, University of Washington	2021
Avalanche Recreational 2, Wilderness First Aid	