

Sophie Ruehr, Ph.D.

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EDUCATION

2020-2025 **University of California Berkeley**

Berkeley, CA

Ph.D. in Environmental Science, Policy, & Management

Coadvised by Trevor Keenan & Manuela Girotto

“Optimizing water-carbon trade-offs: Plant, ecosystem, and management strategies across scales.” My dissertation focuses on the coupling of carbon and water cycles in terrestrial ecosystems using remote sensing, eddy covariance flux tower, and machine learning methodologies, with a focus on solar-induced fluorescence, drought and sustainable water management in agricultural systems.

2014-2018 **Yale University**

New Haven, CT

Bachelor of Science, Geology & Geophysics (cum laude)

“A mechanistic investigation of the oasis effect in the Zhangye cropland in semiarid western China.” For my senior honors thesis, I used surface energy balance theory to partition the observed oasis effect between irrigated cropland and surrounding desert.

RESEARCH & PROFESSIONAL EXPERIENCE

2025 **Max Planck-Caltech-Carnegie-Columbia MC3⁴ Earth Center Postdoctoral Fellow**
Carnegie Institution, Stanford, CA

Research on the water-saving effects of sustainable management using remote sensing, AI, and biophysical modeling with Drs. Lorenzo Rosa and Jeff Dukes.

2025 **Postdoctoral Scholar**

University of California Berkeley

Remote sensing data to quantify effects of expanding sustainable management practices towards drought-resilient ecosystems, with a new focus on fire-drought compound events.

2022-2025 **Sponsored Projects for Undergraduate Research Mentor**

UC Berkeley, CA

I mentor undergraduate students on senior honor thesis research projects, which have included biomass estimation using remote sensing image classification over an oak savanna, bonsai tree 3D modeling, and science communication on social media.

Spring 2024 **Graduate Student Instructor**

UC Berkeley, CA

In Ecosystem Ecology, an upper-level undergraduate class led by Professor Dennis Baldocchi, I taught two sections of 35 students each, designed lesson plans, developed assignments, and gave a guest lecture on remote sensing.

2020-2024 **D-Lab Consultant**

UC Berkeley, CA

At the UC Berkeley D-lab, I consulted graduate students across campus on questions related to data science, statistical methods and coding in R and Python.

2019-2020 **Provincetown Independent Reporter**
Provincetown, MA

As a reporter for a [weekly newspaper](#), I covered a range of topics, including environmental science, policing, and immigration.

2018-2019 **Yale University Huang Fellow**
Port Vila, Vanuatu

I conducted a year-long independent [research project](#) on the historic impacts of climate change, sea level rise, and intensifying cyclones in Vanuatu, a Pacific Island Nation, for use in paleoclimatology research at the Woods Hole Oceanographic Institution.

Summer 2017 **Woods Hole Oceanographic Institution Fellow**
Woods Hole, MA

I analyzed paleoclimate hurricane dynamics estimated from sediment cores to determine deposition dynamics in a coastal pond.

PUBLICATIONS

In review

Ruehr, S., Bassiouni, M., Kang, Y., Socolar, Y., Magney, T., Keenan, T.F. Crop rotation enhances agricultural water use efficiency in California's Central Valley (under consideration, preprint here: [10.21203/rs.3.rs-6322235/v1](#)).

Climate & Environment

Ruehr, S., Gerlein-Safdi, C., Falco, N., Seibert, P., Chou, C., Albert, L., Keenan, T.F. Quantifying seasonal and diurnal cycles of solar-induced fluorescence with a novel hyperspectral imager. 2024. *Geophysical Research Letters*, 51, 14. [10.1029/2023GL107429](#).

Ruehr, S., Giroto, G., Verfaillie, J., Baldocchi, D., Cabon, A., Keenan, T.F. 2023. Ecosystem groundwater use enhances carbon sinks in a semi-arid oak savanna. *Agricultural & Forest Meteorology*, 342, 109725. [10.1016/j.agrformet.2023.109725](#).

Ruehr, S., Keenan, T.F., Williams, C., Zhou, Y., Lu, X., Bastos, A., Canadell, P., Prentice, I.C., Sitch, S., Terrer, C. Evidence and attribution of the enhanced land carbon sink. 2023. *Nature Reviews Earth & Environment*, 4, 518-534. [10.1038/s43017-023-00456-3](#).

Massoud, E.C., Andrews, L., Reichle, R., Molod, A., Park, J., **Ruehr, S.**, Giroto, M. 2022. Seasonal forecasting skill for the High Mountain Asia region in the Goddard Earth Observing System. *Earth System Dynamics*, 14, 147–171. [10.5194/esd-14-147-2023](#).

Ruehr, S. 2021. Beyond the vulnerability/resilience dichotomy: Perceptions of and responses to the climate crisis on Emau, Vanuatu. *Island Studies Journal*. [10.24043/isj.151](#)

Ruehr, S., Lee, X., Smith, R., Li, X., Xu, Z., Liu, S., Yang, X., Zhou, Y. 2020. A mechanistic investigation of the oasis effect in the Zhangye cropland in semiarid western China. *Journal of Arid Environments*, 176, 104120. [10.1016/j.jaridenv.2020.104120](#)

Espeland, M., Hall, J.P., DeVries, P.J., Lees, D.C., Cornwall, M., Hsu, Y., Wu, L., Campbell, D.L., Talavera, G., Vila, R., Salzman, S., **Ruehr, S.**, Lohman, J.D., Pierce, N.E. 2015. Ancient Neotropical origin and recent recolonisation: Phylogeny, biogeography and diversification of the Riodinidae (Lepidoptera: Papilionoidea). *Molecular Phylogenetic Evolution*, 93, 296-306. [10.1016/j.ympev.2015.08.006](#)

Data Consulting

- Rutkove, S.B., Le, M., Nagy, J.A., **Ruehr, S.**, Semple, C., Sanchez, B. 2022. Design and pilot testing of a 26-gauge impedance-electromyography (iEMG) needle in wild type and ALS mice. *Nerve & Muscle*, 65, 6. [10.1002/mus.27551](https://doi.org/10.1002/mus.27551).
- Chin, A., **Ruehr, S.**, Tarulli, A., Rutkove, S. 2007. Saline-saturated Balsa Wood as a Testing Medium for Rotational Electrical Impedance Myography. *IFMBE Proceedings*, 17, 272-275. [10.1007/978-3-540-73841-1_72](https://doi.org/10.1007/978-3-540-73841-1_72)

FUNDING & FELLOWSHIPS; \$400,000 TOTAL

2025 **Be Smart About Safety; \$25,000**

University of California Berkeley

Funding towards department-wide field safety equipment and training

2024 **Postdoctoral Fellowship in Land-Surface Modeling; \$82,500 annually**

Max Planck-Caltech-Carnegie-Columbia MC3⁴ Earth Center

Up to four years of postdoctoral funding

2022 **Future Investigators in NASA Earth and Space Science and Technology; \$150,000**

National Aeronautics and Space Administration (NASA)

Three years of graduate funding

2022 **FLUXNET Secondment; \$8,000**

FLUXNET

Research fellowship for 6 weeks at Centro de Investigación Ecológica y Aplicaciones Forestales, Universitat Autònoma de Barcelona, Spain

2020 **Carol Baird Fieldwork Grant; \$33,000**

University of California Berkeley

In support of solar-induced fluorescence imaging fieldwork

2020 **Achievement Rewards for College Scientists Fellowship; \$100,000**

ARCS Northern California Chapter

Two years of graduate funding

2018 **Parker Huang Undergraduate Travel Fellowship; \$36,000**

Yale University

In support of independent paleoclimate research in Vanuatu

2017 **Karen Von Damm 1977 Fellowship; \$5,000**

Yale University Dept. of Geology & Geophysics

In support of senior honors thesis field research in Lanzhou, China

2017 **Summer Student Fellowship; \$8,000**

Woods Hole Oceanographic Institution

Fellowship on hurricane paleoclimatology research

SERVICE

2024- Dept. Environmental Science, Policy & Management Field Safety Committee

2022-2024 UC Berkeley College of Natural Resources LGBTQ+ Coalition

2021-2024 AmeriFlux Diversity, Equity & Inclusion Committee member
2020-2024 UC Berkeley ESPM Graduate Diversity Council member

AWARDS

2022 **Honorable Mention**

National Science Foundation Graduate Research Fellowship Program

2021 **First Place: Science/Technology Reporting**

New England Newspaper Association

2021 **First Place: Health Reporting**

New England Newspaper Association

2018 **Hammer Prize**

Yale University Department of Geology & Geophysics

Awarded for excellence in the oral presentation of the senior thesis

MENTORING & TEACHING

2024- Edén Gonzalez, UC Berkeley undergraduate student (mentor)

Spring 2024 Ecosystem science, ESPM 111 (graduate student instructor)

2023-4 Adam Rashid, UC Berkeley graduate (mentor)

2022-4 Megan Hur, UC Berkeley undergraduate student (mentor)

2022-3 Tyler Goldstein, UC Berkeley undergraduate student (mentor)

OUTREACH & JOURNALISM

2023 [FLUXNET blog](#)

2022 [Keenan Group TikTok](#)

2022 [AmeriFlux 25 years data visualization tool](#)

2022 [Berkeley Science Review](#)

2019, 2020 [Provincetown Independent](#)

2019 [InsideClimate News](#)

2019 [WOMR Cape Cod's Outermost Radio](#)

2016, 2018 [Provincetown Banner](#)

PRESS

2023 [Ask MIT Climate](#)

2023 [Phys.org](#)

WORKSHOPS

2024 **Center for Climate Sciences Summer School** NASA Jet Propulsion Lab, CA
Week-long course on remote sensing and climate modeling at CalTech and JPL

2024 **Spring Teaching Conference** UC Berkeley, CA
Participation in a one-day workshop on teaching, ethics, and inclusion

2024 **FieldFutures Harassment Prevention Training** UC Berkeley, CA
Participation in a full-day workshop on sexual harassment prevention in fieldwork

- 2024 **DroneCamp** CSU Monterey Bay, CA
5-day field course on mission planning, drone piloting, photogrammetry, and data processing
- 2022 **AmeriFlux Field Safety Workshop**
Leading a one-day workshop for safety and inclusivity in field work
- 2022 **FluxCourse** Nederland, CO
Two-week field course on eddy covariance flux data and modeling

SKILLS

Languages

Bislama (advanced), French (advanced), Italian (basic)

Computer languages

Python, R, MATLAB, Bash, Git

Software

LaTeX, Wordpress, GIS, ENVI, RStudio, Google Earth Engine

Field work

Hyperspectral imager deployment, snow depth and water equivalent, GPS survey, sediment core collection and processing, tree diameter measurement, leaf-level physiology measurements, anthropological research methods, eddy covariance flux tower deployment

REVIEWING

- 2024 Nature Communications Earth & Environment
 2024 Agricultural & Forest Meteorology
 2024 Hydrology
 2024 Nature Communications
 2024 Earth's Future
 2023 AGU Advances
 2023 Proceedings of the National Academy of Sciences
 2023 Geophysical Research Letters
 2021 Journal of Arid Environments

INVITED LECTURES

- Ruehr, S. Land Carbon Modeling (March 2025). Guest lecture for Carbon Cycle Dynamics. University of California Berkeley, CA.
- Ruehr, S. Remote sensing and the biosphere (April 2024). Guest lecture for Ecosystem Ecology. University of California Berkeley, CA.
- Ruehr, S. Evidence and attribution of the land carbon sink's historic enhancement (Fall 2023). EEBIOMASS virtual workshop. Max-Planck Institute for Biogeochemistry, Jena, Germany.
- Ruehr, S. Carbon emissions and offsets: Global and local research (August 2021). Distinguished speaker, ARCS Forward National Speaker Series.
- Ruehr, S. Celebration of Distinguished Fellows Selected Student Speaker (April 2021). University of California Berkeley, CA.

- Ruehr, S. Achievement Rewards for College Scientists Symposium Selected Scholar (April 2021). ARCS National Chapter, USA.
- Ruehr, S. Tracing ancient cyclones: paleoclimate, oral history & climate futures (November 2018). University of the South Pacific Emalus Campus, Vanuatu.
- Ruehr, S. & Lee, X. Intrinsic Biophysical Mechanism Theory & the Oasis Effect (March 2018). Key Laboratory of West China's Environmental System, Lanzhou University, Gansu, China.
- Ruehr, S. & Lee, X. Intrinsic Biophysical Mechanism Theory & the Oasis Effect (March 2018). School of Geography, Beijing Normal University, Beijing, China.

ORAL PRESENTATIONS

- Ruehr, S., Kang, Y., Bassiouni, M., Magney, T., Socolar, Y., Keenan, T.F. Emerging satellite products unveil cropland water use efficiency trends and drivers in California's Central Valley (December 2024). GC21G-04. AGU fall meeting, Washington D.C., USA.
- Ruehr, S. Groundwater drought decreases carbon fixation in a semi-arid oak savannah (Fall 2023). CREAf, Barcelona, Spain.
- Ruehr, S., Giroto, M., Verfaillie, J., Baldocchi, D., Keenan, T.F. Groundwater drought decreases carbon fixation in a semi-arid oak savannah (Fall 2022). GC55A-03. AGU fall meeting, Chicago, IL, USA.
- Ruehr, S., Seibert, P., Gerlein-Safdi, C., Falco, N., Wu, Y., Chou, C., Keenan, T.F. Hyper-spectral imagery illuminates drivers of solar-induced fluorescence across landscapes (Fall 2022). B43C-04. AGU fall meeting, Chicago, IL, USA.
- Ruehr, S., Giroto, M., Keenan, T.F. Quantifying ecosystem reliance on groundwater (Fall 2021). H51E-01. AGU fall meeting, New Orleans, LA, USA.
- Ruehr, S., Gerlein-Safdi, C., Falco, N., Keenan, T.F., Torn, M. S. Picturing SIF: field readiness and initial results from a novel SIF imaging instrument (Fall 2021). B22C-09. AGU fall meeting, New Orleans, LA, USA.
- Ruehr, S., Lee, X., Smith, R... Latent heat drives cooling over oases (December 2020). H026-01A. AGU Fall Meeting, USA.
- Ruehr, S. Stakeholder feedback for a paleoclimate study. (December 10, 2019). Coastal Research Laboratory, Woods Hole Oceanographic Institution, Woods Hole, MA, USA.
- Ruehr, S. The Oasis Effect: Evaluating Intrinsic Biophysical Mechanism Theory and its Implications for Sustainable Water Management in Zhangye, Gansu, China. (May 11, 2018). Dept. of Geology & Geophysics, Yale University, New Haven, CT, USA.

POSTER PRESENTATIONS

- Ruehr, S., Gerlein-Safdi, C., Falco, N., Keenan, T.F., Torn, M. S. Picturing SIF: field readiness and initial results from a novel SIF imaging instrument (Fall 2021). B22C-09. AGU fall meeting, New Orleans, LA, USA.
- Ruehr, S., Giroto, M., Keenan, T.F. Quantifying ecosystem reliance on groundwater (Fall 2021). H51E-01. AGU fall meeting, New Orleans, LA, USA.
- Ruehr, S., Keenan, T.F., Giroto, M. Inter-annual groundwater variation affects ecosystem productivity. (October 2021). AmeriFlux Fall Meeting.
- Ruehr, S., Lee, X., Smith, R... A mechanistic investigation of the oasis effect in the Zhangye cropland in semiarid western China. (October 2020). AmeriFlux Fall Meeting.

- Castagno, K., Ruehr, S., Donnelly, J., Woodruff, J. Grain-size distribution and patterns in storm-induced event beds in a coastal pond. (October 2018). EP13D-2125. American Geophysical Union Fall Meeting.
- Ruehr, S., Castagno, K., Donnelly, J. Newfound aspects of ancient hurricanes: reconstructing storm intensity and sediment deposition dynamics in northeastern coastal ponds. (August 2017). Summer Student Fellow Poster Session, Woods Hole Oceanographic Institution, Woods Hole, MA.