

Nicole Feldl

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Current position

Associate Professor, University of California, Santa Cruz

Research Interests

Climate dynamics • Polar amplification • Large-scale atmospheric circulations • Climate feedbacks and climate sensitivity • Games for learning

Positions

2022-present	Associate Professor Earth and Planetary Sciences University of California, Santa Cruz
2016-2022	Assistant Professor Earth and Planetary Sciences University of California, Santa Cruz
2015-2016	National Science Foundation Postdoctoral Research Fellow Environmental Science and Engineering California Institute of Technology
2013-2015	Foster and Coco Stanback Postdoctoral Scholar Environmental Science and Engineering California Institute of Technology HOST: Simona Bordoni
2007-2013	Graduate Research Assistant Atmospheric Sciences University of Washington
2005-2007	Project Engineer UNAVCO, a non-profit university-governed consortium, facilitates geoscience research and education using geodesy
2002-2005	Graduate Research Assistant Geological Sciences University of Colorado, Boulder

VISITING APPOINTMENTS

2023-2024 Princeton University and the NOAA Geophysical Fluid Dynamics Laboratory, October–March.

Education

2013 PhD in Atmospheric Sciences
University of Washington
ADVISOR: Gerard Roe

2005 MS in Geological Sciences
University of Colorado
ADVISOR: Roger Bilham

2002 BS in Geological Sciences *summa cum laude*
University of North Carolina at Chapel Hill

Honors & Awards

2023 Visiting Research Scholar, Princeton University and the NOAA Geophysical Fluid Dynamics Laboratory

2018 NSF CAREER Award

2015 NSF Postdoctoral Research Fellowship (PRF)

2013 Foster and Coco Stanback Postdoctoral Fellowship

2012 Washington NASA Space Grant Consortium Graduate Fellowship

2011 Outstanding Poster Presentation, World Climate Research Programme Open Science Conference, Denver

2009 Advanced Climate Dynamics Course participant, Bergen, Norway

2007 Achievement Rewards for College Scientists (ARCS) Fellowship, Seattle Chapter

2005 Outstanding Geoscience Student Award, Association for Women Geoscientists, Denver Chapter

2004 Longley, Warner, and Wahlstrom Award, University of Colorado

2002 Op White Prize in Geology, University of North Carolina at Chapel Hill

Grants

2024-present Co-PI, NSF, EAGER: Pedogenic carbonates record insolation driven surface melting in Antarctica, OPP-2423761 (PI: Terrence Blackburn). \$299,055

2023-present PI, NSF, Collaborative Research: Identifying Model Biases in Poleward Heat Transport: Atmosphere-Ocean Partitioning, Trends over the Historical Period and Sub-Seasonal Variability, AGS-2311541. \$71,477

2022-present Lead PI, DOE, Extreme Moist Transport Events as a Driver of Arctic Amplification, DE-SC0023070. \$774,367

2018-2024 PI, NSF, CAREER: The Lapse Rate Feedback and Other Mechanisms of High-Latitude Climate Change, AGS-1753034. \$798,235

2019-2022 Co-PI, NSF, REU: The Lamat Summer Research Program on High Performance Computing in Astrophysics, AST-1852393. \$388,081

- 2018-2021 Co-PI, NSF, MRI: Acquisition of a High Performance Computer for Computational Science at UC Santa Cruz, AST-1828315. \$1,547,000
- 2015-2016 PI, NSF, PRF: Coupling Between Regional Climate Feedbacks and Large-scale Circulation in a Hierarchy of Models, AGS-1524569. \$86,000

Publications

Journal Articles

Advisees are underlined. H-index 19, cumulative citations 1693 (Google Scholar, June 2024).

- 35 England, M. R., N. Feldl, and I. Eisenman (2024), Sea ice perturbations in aquaplanet simulations: Isolating the physical climate responses from model interventions, submitted.
- 34 Chung, P.-C., and N. Feldl (2024), Sea ice loss, water vapor increases, and their interactions with atmospheric energy transport in driving seasonal polar amplification, *Journal of Climate*, 37, 2713–2725, doi:10.1175/JCLI-D-23-0219.1.
- 33 Bonan, D. B., N. Feldl, N. Siler, J. E. Kay, K. C. Armour, I. Eisenman, and G. H. Roe (2024), The influence of climate feedbacks on regional hydrological changes under global warming, *Geophysical Research Letters*, 51, e2023GL106648, doi:10.1029/2023GL106648.
- 32 England, M. R., and N. Feldl (2024), Robust polar amplification in ice-free climates relies on ocean heat transport and cloud radiative effects, *Journal of Climate*, 37, 2179–2197, doi:10.1175/JCLI-D-23-0151.1.
- 31 Kaufman, Z. S., N. Feldl, and C. Beaulieu (2024), Warm Arctic-Cold Eurasia pattern driven by atmospheric blocking in models and observations, *Environmental Research: Climate*, 3(1), 015006, doi:10.1088/2752-5295/ad1f40.
- 30 Feldl, N., and T. M. Merlis (2023), A semi-analytical model for water vapor, temperature, and surface-albedo feedbacks in comprehensive climate models, *Geophysical Research Letters*, 50, e2023GL105796, doi:10.1029/2023GL105796.
- 29 Linke, O., N. Feldl, and J. Quaas (2023), Current-climate sea ice amount and seasonality as constraints for future Arctic amplification, *Environmental Research: Climate*, 2(4), 045003, doi:10.1088/2752-5295/acf4b7.
- 28 Bonan, D. B., N. Feldl, M. D. Zelinka, and L. C. Hahn (2023), Contributions to regional precipitation change and its polar-amplified pattern under warming, *Environmental Research: Climate*, 2(3), 035010, doi:10.1088/2752-5295/ace27a.
- 27 Merlis, T. M., N. Feldl, and R. Caballero (2022), Changes in poleward atmospheric energy transport over a wide range of climates: Energetic and diffusive perspectives and a priori theories, *Journal of Climate*, 35(20), 2933–2948, doi:10.1175/JCLI-D-21-0682.1.
- 26 Santer, B. D., S. Po-Chedley, N. Feldl, J. C. Fyfe, Q. Fu, S. Solomon, M. England, K. B. Rodgers, M. F. Stuecker, C. Mears, C.-Z. Zou, C. J. W. Bonfils, G. Pallotta, M. D. Zelinka, N. Rosenbloom, J. Edwards (2022), Robust anthropogenic signal identified in the seasonal cycle of tropospheric temperature, *Journal of Climate*, 35(18), 6075–6100, doi:10.1175/JCLI-D-21-0766.1.
- 25 Singh, H., N. Feldl, J. E. Kay, and A. L. Morrison (2022), Climate sensitivity is sensitive to changes in ocean heat transport, *Journal of Climate*, 35(9), 2653–2674, doi:10.1175/JCLI-D-21-0674.1.
- 24 Kaufman, Z. S., and N. Feldl (2022), Causes of the Arctic’s lower-tropospheric warming structure, *Journal of Climate*, 35(6), 1983–2002, doi:10.1175/JCLI-D-21-0298.1.

- Taylor, P. C., R. C. Boeke, L. N. Boisvert, N. Feldl, M. Henry, Y. Huang, P. L. Langen, W. Liu, F. Pi-
than, S. A. Sejas, and I. Tan (2022), Process drivers, inter-model spread, and the path forward: A re-
view of amplified Arctic warming, *Frontiers in Earth Science*, 9:758361, doi:10.3389/feart.2021.758361.
- Feldl, N., and T. M. Merlis (2021), Polar amplification in idealized climates: The role of ice, mois-
ture, and seasons, *Geophysical Research Letters*, 48, e2021GL094130, doi:10.1029/2021GL094130.
- Feldl, N., S. Po-Chedley, H. K. A. Singh, S. Hay, and P. J. Kushner (2020), Sea ice and atmospheric
circulation shape the high-latitude lapse rate feedback, *npj Climate and Atmospheric Science*, 3, 41,
doi:10.1038/s41612-020-00146-7.
- Kaufman, Z. S., N. Feldl, W. Weijer, and M. Veneziani (2020), Causal interactions between Southern
Ocean polynyas and high-latitude atmosphere-ocean variability, *Journal of Climate*, 33, 4891–4905,
doi:10.1175/JCLI-D-19-0525.1.
- Siler, N., G. H. Roe, K. C. Armour, and N. Feldl (2019), Revisiting the surface-energy-flux perspec-
tive on the sensitivity of global precipitation to climate change, *Climate Dynamics*, 52, doi:10.1007/s00382-
018-4359-0.
- Bonan, D. B., K. C. Armour, G. H. Roe, N. Siler, and N. Feldl (2018), Sources of uncertainty in the
meridional pattern of climate change, *Geophysical Research Letters*, 45, doi:10.1029/2018GL079429.
- Kim, D., S. M. Kang, Y. Shin, and N. Feldl (2018), Sensitivity of polar amplification to varying in-
solation conditions, *Journal of Climate*, 31, 4933–4947, doi:10.1175/JCLI-D-17-0627.1.
- Anderson, B. T., N. Feldl, and B. R. Lintner (2018), Emergent behavior of Arctic precipitation in re-
sponse to enhanced Arctic warming, *Journal of Geophysical Research: Atmospheres*, 123, doi:10.1002/2017JD026799.
- Feldl, N., B. T. Anderson, and S. Bordoni (2017), Atmospheric eddies mediate lapse rate feedback
and Arctic amplification, *Journal of Climate*, 30, 9213–9224, doi:10.1175/JCLI-D-16-0706.1.
- Feldl, N., S. Bordoni, and T. M. Merlis (2017), Coupled high-latitude climate feedbacks and their im-
pact on atmospheric heat transport, *Journal of Climate*, 30, 189–201, doi:10.1175/JCLI-D-16-0324.1.
- Yang, J., J. Leconte, E. T. Wolf, C. Goldblatt, N. Feldl, T. Merlis, Y. Wang, D. D. B. Koll, F. Ding,
F. Forget, and D. S. Abbot (2016), Differences in water vapor radiative transfer among 1D mod-
els can significantly affect the inner edge of the habitable zone, *The Astrophysical Journal*, 826,
doi:10.3847/0004-637X/826/2/222.
- Feldl, N., and S. Bordoni (2016), Characterizing the Hadley Circulation response through regional
climate feedbacks, *Journal of Climate*, 29, 613–622, doi:10.1175/JCLI-D-15-0424.1.
- Roe, G. H., N. Feldl, K. C. Armour, Y.-T. Hwang, and D. M. W. Frierson (2015), The remote impacts of
climate feedbacks on regional climate predictability, *Nature Geoscience*, 8, 135–139, doi:10.1038/ngeo2346.
- Feldl, N., D. M. W. Frierson, and G. H. Roe (2014), The influence of regional feedbacks on circula-
tion sensitivity, *Geophysical Research Letters*, 41, 2212–2220.
- Rose, B. E. J., K. C. Armour, D. S. Battisti, N. Feldl, and D. D. B. Koll (2014), The dependence of
transient climate sensitivity and radiative feedbacks on the spatial pattern of ocean heat uptake,
Geophysical Research Letters, 41, doi:10.1002/2013GL058955.
- Feldl, N., and G. H. Roe (2013), Four perspectives on climate feedbacks, *Geophysical Research Let-
ters*, 40, doi:10.1002/grl.50711.
- Feldl, N., and G. H. Roe (2013), The nonlinear and nonlocal nature of climate feedbacks, *Journal of
Climate*, 26, 8289–8304, doi:10.1175/JCLI-D-12-00631.1.
- Feldl, N., and G. H. Roe (2011), Climate variability and the shape of daily precipitation: A case
study of ENSO and the American West, *Journal of Climate*, 24, 2483–2499.

- 5 **Feldl, N.**, and G. H. Roe (2010), Synoptic weather patterns associated with intense ENSO rainfall in the southwest United States, *Geophysical Research Letters*, 37.
- 4 **Feldl, N.**, and R. Bilham (2006), Great Himalayan earthquakes and the Tibetan Plateau, *Nature*, 444, 165–170.
- 3 Bilham, R., E. R. Engdahl, N. **Feldl**, and S. P. Satyabala (2005), Partial and complete rupture of the Indo-Andaman plate boundary 1847-2004, *Seismological Research Letters*, 76, 299–311.
- 2 Hough, S. E., R. Bilham, N. Ambraseys, and N. **Feldl** (2005), The 1905 Kangra and Dehra Dun earthquakes, *Geological Survey of India Special Publications*, 85, 15–22.
- 1 Hough, S. E., R. Bilham, N. Ambraseys, and N. **Feldl** (2005), Revisiting the 1897 Shillong and 1905 Kangra earthquakes in northern India: Site response, Moho reflections and a triggered earthquake, *Current Science*, 88, 1632–1638.

Professional Activities

Activities and Memberships in Professional Associations

- 2024-present Member, Polar Amplification Model Intercomparison Project (PAMIP2) Committee.
- 2023-present Member Representative to the University Corporation for Atmospheric Research (UCAR).
- 2023-2024 Chair of Scientific Organizing Committee, Workshop on Polar Amplification of Climate Change across Hemispheres and Seasons, Boulder, Colorado, January 2024 (with Patrick Taylor).
- 2023 Lead, Application for UC Santa Cruz to join the University Corporation for Atmospheric Research (UCAR) as a new member.
- 2022 Session Chair, Idealized Model Approaches to the Atmosphere and Ocean Circulation, AMS Conference on Atmospheric and Oceanic Fluid Dynamics, Breckenridge.
- 2018-2021 Lead Designer, *Warmer*, a web-based game designed to teach middle and high school students about the feedbacks and forcings that govern global climate change (with Elizabeth Swensen).
- 2014-present Member, American Meteorological Society
- 2004-present Member, American Geophysical Union

Editor

Guest Editor, Focus on Arctic Amplification collection, *Environmental Research: Climate*.

Reviewer

JOURNALS

Geophysical Research Letters, *Journal of Climate*, *Journal of Geophysical Research: Atmospheres*, *Nature Geoscience*, *Environmental Research: Climate*, *Nature Communications*, *npj Climate and Atmospheric Science*, *Earth's Future*, *Proceedings of the National Academy of Sciences*, *Science Advances*, *Journal of Advances in Modeling Earth Systems*, *Climate Dynamics*.

FUNDING AGENCIES

National Science Foundation (ad hoc and panel), National Oceanic and Atmospheric Administration.

Invited Presentations

2024	ECS and Cloud Feedback Virtual Symposium, March 2024.
2024	Lamont-Doherty Earth Observatory, Ocean and Climate Physics Seminar, February 2024.
2024	Yale University, Atmosphere, Ocean, and Climate Dynamics Seminar, January 2024.
2023	Johns Hopkins University, Bromery Seminar, October 2023.
2023	IARPC (Interagency Arctic Research Policy Committee), Modelers Community of Practice Webinar, April 2023.
2022	Princeton Center for Theoretical Science, From Spectroscopy to Climate Workshop, August 2022.
2022	Stormtracks 2022 Workshop, Oléron Island, France, June 2022.
2022	University of California, Los Angeles, Atmospheric and Oceanic Sciences Seminar, April 2022.
2022	Stanford University, Earth System Science Seminar, March 2022.
2022	University of Trento (Italy), Weather and Climate: From Fundamentals to Applications Seminar, March 2022.
2021	PAMIP (Polar Amplification Model Intercomparison Project) Webinar, December 2021.
2021	ECS and Cloud Feedback Virtual Symposium, July 2021.
2021	DOE RGMA Program, High-Latitude Processes and Feedbacks Webinar, June 2021.
2021	University of California, Irvine, Earth System Science Seminar, May 2021.
2021	University of Chicago, Geophysical Sciences Seminar, May 2021.
2021	George Mason University, Climate Dynamics Seminar, April 2021.
2021	Leipzig University (Germany), Graduate School for Clouds, Aerosols and Radiation, Advanced Training Module: The Lapse-rate feedback in the Arctic, March 2021.
2021	McGill University (Canada), Atmospheric and Oceanic Sciences Seminar, February 2021.
2021	University of California, Riverside, Hewett Club Lecture, February 2021.
2021	University of California, Los Angeles, Atmospheric Dynamics Seminar, January 2021.
2020	Stanford University, Atmosphere, Ocean, and Climate Dynamics Seminar, November 2020.
2020	Scripps Institution of Oceanography, Climate Journal Club, October 2020.
2020	National Taiwan University (Taiwan), postponed due to COVID-19 pandemic.
2020	University of Toronto (Canada), Noble Seminar in Atmospheric Physics, March 2020.
2018	DOE RGMA Program, High-Latitude Processes and Feedbacks Webinar, February 2018.
2017	Lawrence Livermore National Laboratory, Climate and Weather Seminar, November 2017.
2017	San Jose State University, Geology Club Seminar, October 2017.
2017	University of California, Santa Cruz, Geophysical and Astrophysical Fluid Dynamics Seminar, May 2017.
2015	MIT, Atmospheric Science Seminar, Cambridge, November 2015.
2015	University of Rochester, Earth and Environmental Sciences Seminar, April 2015.
2015	University of California, Santa Cruz, Earth and Planetary Sciences Seminar, March 2015.
2015	Boston University, Earth and Environment Department Seminar, February 2015.
2015	Colorado College, Environmental Program Seminar, January 2015.
2014	Portland State University, Geography Seminar, November 2014.
2014	University of California, Berkeley, Earth and Planetary Science Seminar, March 2014.
2014	Caltech, Environmental Science and Engineering Seminar, February 2014.
2013	University of Washington, Atmospheric Sciences Colloquium, June 2013.

2013 NCAR, CESM Climate Variability and Change Working Group Meeting, March 2013.
2010 University of Washington, Atmospheric and Climate Dynamics Seminar, January 2010.

University Service

Member, Graduate Student Awards Committee, 2023–2024
Member, Graduate Admissions Committee, 2022–2023, 2021–2022, 2020–2021, 2019–2020
Member, Thesis Committee: Mason Leandro (PhD 2023), Carver Bierson (PhD 2020), John O'Brien (PhD 2019)
Member, Faculty Search Committee for Astronomy and Astrophysics, 2017–2018
Coordinator, Whole Earth Seminar Series, Fall 2017
Member, Faculty Search Committee for Fresh Water, 2016–2017

Advising

POSTDOCTORAL SCHOLARS

2024-present Weiming Ma (Pacific Northwest National Laboratory, co-advised by Hailong Wang)
2023-present Alexandre Audette
2021-2023 Mark England - now Royal Commission for the Exhibition of 1851 Research Fellow at the University of Exeter

PHD STUDENTS

2024-present Parke Funderburk
2020-present Po-Chun Chung
2017-2022 Zachary Kaufman (NSF Graduate Research Fellow) - now postdoc at Stanford University

MS STUDENTS

2021-present Hayes Devaney (Cota-Robles Fellow)

UNDERGRADUATE RESEARCHERS

Benjamin Theunissen (2023; NOAA Hollings Scholar), Henry Olling (2023–2024), Emiliia Dyrenkova (2020–2021; Lamat Fellow), Omar Rosales Cortez (2019), Ricky Calzada (2018–2019), Flor Vanessa Maciel (2018–2019; Koret Scholar)

GRADUATE GAME DESIGNERS

co-advised with Elizabeth Swensen
Devi Acharya (2021)

UNDERGRADUATE GAME DESIGNERS

co-advised with Elizabeth Swensen
Dallas Truong (2020), Janel Catajoy (2019–2020), Xueer Zhu (2019–2020), Amber Sargeant (2019–2020), Sean Song (2018–2020), Tiffany Phan (2018–2020), Joshua Husting (2018–2019), Alexandria McGill (2018–2019), Emily Rodriguez (2018–2019)

Teaching

University of California, Santa Cruz

Introduction to Weather and Climate (EART 12; lower division)

Winter 2023, Winter 2022, Winter 2021, Fall 2019, Winter 2019, Winter 2018, Fall 2016

The Atmosphere (EART 121; upper division)

Fall 2022, Fall 2020, Fall 2018

Modeling Earth's Climate (EART 124; upper division)

Spring 2024, Winter 2023, Spring 2022, Spring 2021, Spring 2020, Spring 2018

Hydroclimatology (EART 252; graduate)

Fall 2021 (with Margaret Zimmer), Winter 2020 (with Margaret Zimmer)

Topics in Atmospheric Science (EART 290M; graduate)

Fall 2017 (with Noah Finnegan), Spring 2017

University of Washington

Introduction to Weather (ATMS 101; lower division), Summer 2011

Teaching Assistantships

Climate and Climate Change (ATMS 211), University of Washington, Spring 2010

Earth System and Climate (ESS 201), University of Washington, Winter 2009

Introduction to Geology (GEOL 1030), University of Colorado, Spring 2003

Introduction to Geology (GEOL 1030), University of Colorado, Fall 2002