Department of Atmospheric and Climate Science
University of Washington
✉ dbonan@uw.edu
www.davebonan.com

David B. Bonan

Research Interests

I study the physics and dynamics of Earth's climate and how it changes. My research seeks to advance fundamental understanding of the atmosphere and ocean and their interactions with the cryosphere and land, across timescales from days to millennia. I draw on observations and use a range of tools, including comprehensive Earth system models, targeted experiments across models of varying complexity, mathematical conceptual models that distill key processes, and advanced statistical methods.

Education

2025 **Ph.D., Environmental Science and Engineering**
California Institute of Technology — Pasadena, CA

2021 **M.S., Environmental Science and Engineering**
California Institute of Technology — Pasadena, CA

2019 **B.S., Atmospheric Sciences | Minor, Applied Mathematics | College Honors**
University of Washington — Seattle, WA

Appointments & Experience

2024 – now **Visiting Scientist**
Climate and Global Dynamics, NSF National Center for Atmospheric Research — Boulder, CO

2024 – 2026 **CICOES Postdoctoral Research Fellow**
Department of Atmospheric and Climate Science, University of Washington — Seattle, WA

2024 **Postdoctoral Research Associate**
Environmental Science and Engineering, California Institute of Technology — Pasadena, CA

2019 – 2024 **Graduate Research Assistant**
Environmental Science and Engineering, California Institute of Technology — Pasadena, CA

2017 – 2019 **Mary Gates Research Fellow**
Department of Atmospheric Sciences, University of Washington — Seattle, WA

2017 – 2018 **Undergraduate Research Assistant**
Department of Earth and Space Sciences, University of Washington — Seattle, WA

2016 – 2019 **Undergraduate Assistant**
Program on Climate Change, University of Washington — Seattle, WA

2014 – now **Freelance Artist**
Self Employed — Boulder, CO

Honors, Awards, & Fellowships

2025 – 2026 Data Science Postdoctoral Fellowship, University of Washington eScience Institute
2024 – 2026 Cooperative Institute for Climate, Ocean, & Ecosystem Studies Postdoctoral Fellowship
2024 California Institute of Technology Geological and Planetary Sciences Award for Academic Excellence in Research
2024 Nature Reviews Earth & Environment Research Highlight for Dong et al., (2023): "Drivers of Southern Ocean cooling"
2023 American Geophysical Union Fall Meeting Outstanding Student Presentation Award
2022 The Nansen Legacy Research Fellowship
2022 Advanced Climate Dynamics Course Participant in Rondane, Norway
2022 California Geophysical Fluid Dynamics Student Presentation Award
2021 – 2024 National Science Fellowship Graduate Research Fellowship
2020 IACS-IGS Graham Cogley Award Honorable Mention
2019 – 2020 American Meteorological Society Graduate Fellowship
2019 – 2020 California Institute of Technology Graduate Fellowship
2019 American Geophysical Union Editors' Highlight for Bonan et al., (2018): "Identifying Uncertainties in Climate Models"

2018 Mary Gates Research Scholarship
2018 American Meteorological Society Senior Named Scholarship
2018 American Alpine Club Research Grant
2017 Mary Gates Research Scholarship
2017 – 2019 Ernest F. Hollings Undergraduate Scholarship
2015 – 2019 CenturyLink Scholarship
2015 Premier Members Credit Union Scholarship

Publications

https://scholar.google.com/citations?user=SLZbVj8AAAAJ&hl=en

Peer-Reviewed

* indicates student advisee

Submitted

30. Q. Ding, T. J. Ballinger, D. Kondrashov, G. Chen, P. Zhang, and **D. B. Bonan**: A Rossby wave-driven intraseasonal atmospheric mode regulates Arctic summer warming and moistening.
29. M. Bushuk, **D. B. Bonan**, S. M. Griffies, W. Gregory, Y. Zhang, B. Hurlin, Y.-T. Chen, T. Rackow, and H. F. Goessling: Historical and projected Antarctic sea ice trends across high-resolution coupled model hierarchies.
28. H. F. Drake, **D. B. Bonan**, I. Keshwani, R. Liu, A. Meza, M. Poinelli, P. A. Rafter, M. Rugenstein, K. Uyeda, and K. Willcott: Collapse and recovery of abyssal circulation and ventilation under warming.
27. E. R. Newsom, **D. B. Bonan**, A. F. Thompson, K. C. Armour, and L. Zanna: Controls on the timescale of Earth's climate response to greenhouse-gas forcing.
26. J. Zhu, B. Otto-Bliesner, J. Tierney, E. C. Brady, I. Simpson, **D. B. Bonan**, and D. J. Lunt: More equable past and future warm climates in unprecedented high-resolution simulations.
25. B. G. Buchovecky, F. H. Lambert, C. M. Zarakas, M. M. Laguë, C. D. Koven, I. Fung, **D. B. Bonan**, and A. L. S. Swann: Reduced evapotranspiration and associated warming increase moisture convergence but decrease precipitation over land.
24. **D. B. Bonan** and T. Schneider: Estimating the maximum mean precipitation in hothouse climates.

2026

23. C. Hankel and **D. B. Bonan** (2026): Transient evolution of polar amplification under different CO_2 ramping rates. *Geophysical Research Letters*, 53 (6), e2025GL120079. doi: 10.1029/2025GL120079
22. **D. B. Bonan**, M. M. Laguë, and W. R. Boos (2026): Impact of continental configuration on the climate response to greenhouse-gas forcing in an idealized GCM. *Geophysical Research Letters*, 53 (5), e2025GL120128. doi: 10.1029/2025GL120128

2025

21. **D. B. Bonan**, A. F. Thompson, T. Schneider, L. Zanna, K. C. Armour, and S. Sun (2025): Observational constraints imply limited future Atlantic meridional overturning circulation weakening. *Nature Geoscience*, 18 (6), 479-487. doi: 10.1038/S41561-025-01709-0
20. **D. B. Bonan**, J. E. Kay, N. Feldl and M. D. Zelinka (2025): Mid-latitude clouds contribute to Arctic amplification via interactions with other climate feedbacks. *Environmental Research: Climate*, 4 (1), 015001. doi: 10.1088/2752-5295/ADA84B

2024

19. R. N. Patel, **D. B. Bonan**, and T. Schneider (2024): Changes in the frequency of observed temperature extremes largely driven by a distribution shift. *Geophysical Research Letters*, 51 (24), e2024GL110707. doi: 10.1029/2024GL110707
18. **D. B. Bonan**, T. Schneider, and J. Zhu (2024): Precipitation over a wide range of climates simulated with comprehensive GCMs. *Geophysical Research Letters*, 51 (16), e2024GL109892. doi: 10.1029/2024GL109892
17. M. S. Nayak*, **D. B. Bonan**, E. R. Newsom, and A. F. Thompson (2024): Controls on the strength and structure of the Atlantic meridional overturning circulation in climate models. *Geophysical Research Letters*, 51 (11), e2024GL109055. doi: 10.1029/2024GL109055
16. **D.B. Bonan**, J. Dörr, R.C.J. Wills, A.F. Thompson, and M. Årthun (2024): Sources of low-frequency variability in observed Antarctic sea ice. *The Cryosphere*, 18 (4), 2141-2159. doi: 10.5194/TC-18-2141-2024

15. **D. B. Bonan**, 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 (3), e2023GL106648. doi: 10.1029/2023GL106648

2023

14. Y. Dong, L. M. Polvani, and **D. B. Bonan** (2023): Recent multi-decadal Southern Ocean surface cooling unlikely caused by Southern Annular Mode trends. *Geophysical Research Letters*, 50 (23), e2023GL106142. doi: 10.1029/2023GL106142
13. N. Siler, **D. B. Bonan**, and A. Donohoe (2023): Diagnosing mechanisms of hydrologic change under global warming in the CESM1 Large Ensemble. *Journal of Climate*, 36 (23), 8243-8257. doi: 10.1175/JCLI-D-23-0086.1
12. J. Dörr, **D. B. Bonan**, M. Årthun, L. Svendsen, and R. C. J. Wills (2023): Forced and internal components of observed Arctic sea-ice changes. *The Cryosphere*, 17 (9), 4133-4153. doi: 10.5194/TC-17-4133-2023
11. E. A. Wilson, **D. B. Bonan**, A. F. Thompson, N. Armstrong, and S. C. Riser (2023): Mechanisms for abrupt summertime circumpolar surface warming in the Southern Ocean. *Journal of Climate*, 36 (20), 7025-7039. doi: 10.1175/JCLI-D-22-0501.1
10. **D. B. Bonan**, 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
9. **D. B. Bonan**, N. Siler, G. H. Roe, and K. C. Armour (2023): Energetic constraints on the pattern of changes to the hydrological cycle under global warming. *Journal of Climate*, 36 (10), 3499-3522. doi: 10.1175/JCLI-D-22-0337.1

2022

8. **D. B. Bonan**, A. F. Thompson, E. R. Newsom, S. Sun, and M. Rugenstein (2022): Transient and equilibrium responses of the Atlantic overturning circulation to warming in coupled climate models: the role of temperature and salinity. *Journal of Climate*, 35 (15), 5173-5193. doi: 10.1175/JCLI-D-21-0912.1

2021

7. **D. B. Bonan**, T. Schneider, I. Eisenman, and R. C. J. Wills (2021): Constraining the date of a seasonally ice-free Arctic using a simple model. *Geophysical Research Letters*, 48 (18), e2021GL094309. doi: 10.1029/2021GL094309
6. **D. B. Bonan**, F. Lehner, and M. M. Holland (2021): Partitioning uncertainty in projections of Arctic sea ice. *Environmental Research Letters*, 16 (4), 044002. doi: 10.1088/1748-9326/ABE0EC

2020

5. M. Bushuk, M. Winton, **D. B. Bonan**, E. Blanchard-Wrigglesworth, and T. Delworth (2020): A mechanism for the Arctic sea ice spring predictability barrier. *Geophysical Research Letters*, 47 (13), e2020GL088335. doi: 10.1029/2020GL088335
4. **D. B. Bonan** and E. Blanchard-Wrigglesworth (2020): Nonstationary teleconnection between the Pacific Ocean and Arctic sea ice. *Geophysical Research Letters*, 47 (2), e2019GL085666. doi: 10.1029/2019GL085666

2019

3. **D. B. Bonan**, J. E. Christian, and K. Christianson (2019): Influence of North Atlantic climate variability on glacier mass balance in Norway, Sweden and Svalbard. *Journal of Glaciology*, 65 (252), 580-594. doi: 10.1017/JOG.2019.35
2. **D. B. Bonan**, M. Bushuk, and M. Winton (2019): A spring barrier for regional predictions of summer Arctic sea ice. *Geophysical Research Letters*, 46 (11), 5937-5947. doi: 10.1029/2019GL082947

2018

1. **D. B. Bonan**, 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 (17), 9131-9140. doi: 10.1029/2018GL079429

Non-Refereed

- **D.B. Bonan** (2025): Explications of a changing climate. Ph.D. Dissertation. California Institute of Technology.
- **D.B. Bonan** (2019): Disaggregating uncertainty in the regional climate response. Undergraduate Honors Thesis. University of Washington.

Grants

Research

2026 UW CRESST Expansion Award Type 3 ($75,455): Efficacy and impacts of sea ice thickening in a changing Arctic. (Co-PI)

2024 – 2027 NSF-OCE-2421811 ($531,189): Oceanic constraints on global surface warming across timescales. (Unfunded Collaborator)

Computer

2024 NSF NCAR HPC Exploratory Allocation (1,000,000 core-hours): Impact of model resolution on climate processes in an idealized GCM.

2023 NSF NCAR HPC Exploratory Allocation (450,000 core-hours): Effects of continental land distribution on the climate response to greenhouse gas forcing.

2020 NSF NCAR HPC Exploratory Allocation (105,000 core-hours): Using a model hierarchy to identify mechanisms of sea ice loss.

Presentations

Invited Seminars & Colloquia

2026 University of Washington, Atmospheric and Climate Dynamics Seminar; Colorado State University, Department of Atmospheric Science Colloquium

2025 University of Washington, Physical Oceanography Seminar; National Center for Atmospheric Research, Climate and Global Dynamics Seminar; California Institute of Technology, Division of Geological and Planetary Sciences Seminar; University of California, Berkeley, Earth & Planetary Science Seminar; University of Washington, Atmospheric and Climate Science Seminar

2024 Oregon State University, College of Earth, Ocean, and Atmospheric Sciences Seminar

2023 University of Washington, Atmospheric and Climate Dynamics Seminar; National Center for Atmospheric Research, Paleo and Polar Climate Section; National Center for Atmospheric Research, Climate Analysis Section

2022 University of Bergen, Bjerknes Centre for Climate Research Seminar; University of Bergen, Physical Oceanography Seminar; Oregon State University, Physics of Oceans and Atmospheres Seminar

2021 California Institute of Technology, Environmental Science, Engineering, and Society Seminar; Colorado State University, Large Scale Dynamics Series

2020 California Institute of Technology, Environmental Science, Engineering, and Society Seminar

Conferences & Workshops

2025 American Geophysical Union Fall Meeting; American Geophysical Union Fall Meeting; Cooperative Institute for Climate, Ocean, and Ecosystem Studies Symposium; Kavli Institute for Theoretical Physics

2024 National Center for Atmospheric Research, Paleoclimate Working Group Meeting

2023 American Geophysical Union Fall Meeting

2022 American Geophysical Union Fall Meeting; Ocean Sciences Meeting

2021 American Geophysical Union Fall Meeting; California Geophysical Fluid Dynamics Meeting; National Center for Atmospheric Research, Community Earth System Model Workshop; Conference on Polar Meteorology and Oceanography; European Geophysical Union General Assembly; National Center for Atmospheric Research, Polar Climate Working Group Meeting

2020 American Geophysical Union Fall Meeting (invited); American Geophysical Union Fall Meeting; United States Climate Variability and Predictability Program, Ocean Sciences Meeting

2019 Conference on Polar Meteorology and Oceanography

Poster

2025 University of Washington, Program on Climate Change Summer Institute

2024 United States Climate Variability and Predictability Program Workshop

2023 American Geophysical Union Fall Meeting

2022 California Geophysical Fluid Dynamics Meeting; Conference on Polar Meteorology and Oceanography; United States Climate Variability and Predictability Program Workshop; Ocean Sciences Meeting (invited)

2021 Cloud Feedback Model Intercomparison Project Meeting

2019 American Geophysical Union Fall Meeting; National Center for Atmospheric Research, Polar Modeling Workshop; American Meteorological Society Annual Meeting

2018 American Geophysical Union Fall Meeting; University of Washington, Program on Climate Change Summer Institute; University of Washington, Program on Climate Change Symposium

2017 American Geophysical Union Fall Meeting

Virtual Seminars

2026 Polar Amplification Modeling Intercomparison Project Webinar; Geophysical Fluid Dynamics Laboratory Climate Journal Club

2022 ECS and Cloud Feedback Virtual Symposium (invited)

2020 Working Group on Large Ensembles (invited)

Workshops & Courses

Workshops

2026 Broadening Earth System Research Across Scales with High-Resolution Modeling. United States Climate Variability and Predictability Program Workshop. Boulder, Colorado.

2026 Collapse of the Atlantic Ocean circulation: Can it? Has it? Will it?. Advanced Research and Intervention Agency. London, United Kingdom.

2026 The Recent Pause in Arctic Climate Trends. Kavli Institute for Theoretical Physics. Santa Barbara, California.

2025 Paleoclimate Constraints on Future Climate. Program on Climate Change Summer Institute, University of Washington, Friday Harbor, Washington.

2025 The Physics of Changing Polar Climate. Kavli Institute for Theoretical Physics. Santa Barbara, California.

2023 Polar Amplification of Climate Change Across Hemispheres and Seasons: Causes and Constraints. United States Climate Variability and Predictability Program Workshop. Boulder, Colorado.

2022 The Pattern Effect: Coupling of SST Patterns, Radiative Feedbacks, and Climate Sensitivity. United States Climate Variability and Predictability Program Workshop. Boulder, Colorado.

2019 CESM Polar Modeling Workshop, National Center for Atmospheric Research, Boulder, Colorado.

2019 CESM Tutorial. National Center for Atmospheric Research, Boulder, Colorado.

2018 Sources of Uncertainty in Long-term Climate Projections. Program on Climate Change Summer Institute, University of Washington, Friday Harbor, Washington.

2018 Using Past Observations to Constrain Future Climate Variability and Change. Program on Climate Change Workshop, University of Washington, Seattle, Washington.

2018 Annual West Antarctic Ice sheet Workshop. University of Washington, Coupeville, Washington.

2016 The Climate of Antarctica and the Southern Ocean. Program on Climate Change Summer Institute, University of Washington, Friday Harbor, Washington.

Courses

2025 Sikumiut Field School for Sea Ice Knowledge Holders. Utqiagvik, Alaska.

2022 Dynamics of the Global Water Cycle. Advanced Climate Dynamics Course, Rondane, Norway.

Advising, Teaching, & Mentoring

Advising

□ **Undergraduate Students**

- Sydney Vernon (2023 – 2025)
- Manali Nayak (2022 – 2023)

Teaching

□ **Guest Lectures**

- Climate System Physics, University of Texas, Austin, Virtual, November 2025
- Exploring the Atmospheric Sciences, University of Washington, Seattle, Washington, April 2025
- Sikumiut Field School for Sea Ice Knowledge Holders, Utqiagvik, Alaska, April 2025
- Ocean and Climate Dynamics, Oregon State University, Corvallis, Oregon, August 2024

□ **Teaching Assistant**

- ESE 136: Climate Models California Institute of Technology
  → Spring 2023
- ESE 102: Earth's Oceans California Institute of Technology
  → Fall 2021
- ESE 101: Earth's Atmosphere California Institute of Technology
  → Fall 2020

Mentoring

2021 – 2024 Mentor, Division of Geological and Planetary Sciences, California Institute of Technology

2020 – now Mentor, Graduate Student Mentorship Initiative (GSMI)

Service and Synergistic Activities & Leadership

Service and Synergistic Activities

- **Peer Reviewer**

  Annals of Glaciology; *Climate Dynamics*; *Communications Earth & Environment*; *Earth's Future*; *Environmental Research: Climate*; *Environmental Research Letters*; *Geophysical Research Letters*; *Journal of Advances in Modeling Earth Systems*; *Journal of Climate*; *Journal of Geophysical Research: Oceans*; *Nature Communications*; *Nature Geoscience*; *npj Climate and Atmospheric Science*; *Proceedings in the National Academy of Sciences*; *Science Advances*; *The Cryosphere*

- **Proposal Reviewer**

  United States National Science Foundation

- **Session Organizer**
  - 18th Conference on Polar Meteorology and Oceanography
  - 17th Conference on Polar Meteorology and Oceanography
  - 16th Conference on Polar Meteorology and Oceanography
- **Professional Memberships**
  - American Geophysical Union
  - American Meteorological Society
  - European Geophysical Union

Leadership

2024 – now Committee Member, American Meteorological Society Committee on Polar Meteorology and Oceanography

2021 – 2024 Student Representative, American Meteorological Society Committee on Polar Meteorology and Oceanography

Volunteering and Outreach & Writing

Volunteering and Outreach

- Design for a US CLIVAR Program workshop titled "Confronting Earth System Model Trends with Observations: The Good, the Bad, and the Ugly", September 2023.
- Panelist for a Caltech Public Programming event titled "Behind The Book with Gaia Vince – Nomad Century: How Climate Migration Will Reshape Our World", November 2022.
- Design for a US CLIVAR Program workshop titled "The Pattern Effect: Coupling of SST patterns, radiative feedbacks, and climate sensitivity", May 2022.
- Volunteer for "Eliot Arts Magnet Academy Middle School Science, Technology, Engineering, Environment and Health Night", January 2020.
- Volunteer for "Climate Science Workshops for High School Science Teachers: Does a few degrees of global warming matter?", May 2019.
- Panelist for "University of Washington College of the Environment Student Visit Day", August 2017.

Writing

- The Future of Arctic sea ice. Polar Bears International. September 2021.
- Making the esoteric pertinent: a talk with Prof. Inez Fung. Program on Climate Change, University of Washington. March 2017.
- An emerging scientist explores the intersection of climate activism and science. Program on Climate Change, University of Washington. September 2016.

Computer Skills

Basic Shell-scripting, R

Intermediate LaTeX, Adobe Photoshop & Illustrator, Linux, GitHub

Advanced MATLAB, Python, Julia, Fortran