

Justin Finkel
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<https://justinfocus12.github.io>

Education

- 2017-2022 **Ph.D.**, Computational and Applied Mathematics, University of Chicago
Thesis topic: Atmospheric extremes through the lens of transition path theory
Advisor: Jonathan Weare (NYU)
- 2013-2017 **B.A.**, Physics and Mathematics, *Magna Cum Laude*, Washington University in St. Louis
Thesis topic: Changing World Temperature Statistics
Advisor: Jonathan Katz

Employment

- 2027 In January I will start a new role as **Assistant professor**, School of Complex Adaptive Systems, Arizona State University.
- 2025-2026 **Postdoctoral Fellow**, Data Science Institute and Department of Geophysical Sciences, University of Chicago (Advisors: Pedram Hassanzadeh, Dorian Abbot)
- 2022-2025 **Postdoctoral Associate**, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology (Advisor: Paul O’Gorman)
- 2019 **Summer intern**, Los Alamos National Laboratory
- 2017-2020 **Online tutor**, Varsity Tutors
- 2013-2017 **Academic mentor**, Cornerstone Learning Center, Washington University in St. Louis
- 2016 **Summer intern**, MIT Lincoln Laboratory
- 2015 **Research assistant**, Remote Sensing Laboratory, Department of Earth and Planetary Sciences, Washington University in St. Louis (Advisor: Raymond Arvidson)
- 2014 **Research assistant**, Department of Physics and McDonnell Center for the Space Sciences, Washington University in St. Louis (Advisors: Christine Floss and Ernst Zinner)

Publications

Submitted

2. **Finkel**, J. Routes to rare events with optimally timed perturbations: a Tent Map is all you need. arXiv: [2606.29703 \[physics.ao-ph\]](https://arxiv.org/abs/2606.29703) (2026).
4. Seviour, W. J. M., **Finkel**, J., Rupp, P., Mudhar, R., Butler, A. H., Garfinkel, C. I., Hitchcock, P., Ayarzagüena, B., Hong, D.-C., Hyun, Y.-K., Kim, H., Lim, E.-P., De Maeseneire, D., Messori, G., Koren, G., Sigmond, M., Simpson, I. R. & Son, S.-W. Forecast-based attribution of the role of stratospheric variability in weather extremes. *EGUsphere* **2026**. In revision, 1–28. <https://egusphere.copernicus.org/preprints/2026/egusphere-2026-230/> (2026).

5. Boscu, D., Hernandez, D., Ventura, F., Abbot, D., Chattopadhyay, A., Finkel, J. & Hassan-zadeh, P. An AI Emulator of Holton-Mass Stochastic Sudden Stratospheric Warming with Faithful Dynamical Representation and an Interpretable Latent Structure. *ESS Open Archive* 2025. eprint: <https://essopenarchive.org/doi/pdf/10.22541/essoar.176487466.68250093/v1> (2025).
7. Packman, S., **Finkel**, J., Abbot, D. S. & Tziperman, E. Using a rare event sampling technique to quantify extreme El Niño event statistics. arXiv: 2512.23038 [physics.ao-ph] (2025).

Published

1. Finkel, J. & O’Gorman, P. A. Boosting ensembles for statistics of tails at conditionally optimal advance split times. *Nonlinear Processes in Geophysics* **33**, 233–265. <https://npg.copernicus.org/articles/33/233/2026/> (2026).
3. Finkel, J. & O’Gorman, P. A. Rare Event Sampling for Moving Targets: Extremes of Temperature and Daily Precipitation in a General Circulation Model. *Journal of Advances in Modeling Earth Systems* **18**, e2025MS005456 2025MS005456, e2025MS005456. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2025MS005456> (2026).
8. **Finkel**, J. & O’Gorman, P. A. Bringing Statistics to Storylines: Rare Event Sampling for Sudden, Transient Extreme Events. *Journal of Advances in Modeling Earth Systems* **16**, e2024MS004264. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2024MS004264> (2024).
12. Zhang, H., **Finkel**, J., Abbot, D. S., Gerber, E. P. & Weare, J. Using Explainable AI and Transfer Learning to Understand and Predict the Maintenance of Atlantic Blocking With Limited Observational Data. *Journal of Geophysical Research: Machine Learning and Computation* **1**, e2024JH000243. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2024JH000243> (2024).
13. **Finkel**, J., Gerber, E. P., Abbot, D. S. & Weare, J. Revealing the Statistics of Extreme Events Hidden in Short Weather Forecast Data. *AGU Advances* **4**, e2023AV000881. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2023AV000881> (2023).
18. Strahan, J., **Finkel**, J., Dinner, A. R. & Weare, J. Predicting rare events using neural networks and short-trajectory data. *Journal of Computational Physics* **488**, 112152. ISSN: 0021-9991. <https://www.sciencedirect.com/science/article/pii/S0021999123002474> (2023).
19. **Finkel**, J., Webber, R. J., Gerber, E. P., Abbot, D. S. & Weare, J. Data-driven transition path analysis yields a statistical understanding of sudden stratospheric warming events in an idealized model. *Journal of the Atmospheric Sciences*. <https://journals.ametsoc.org/view/journals/atsc/aop/JAS-D-21-0213.1/JAS-D-21-0213.1.xml> (2022).
22. **Finkel**, J., Webber, R. J., Gerber, E. P., Abbot, D. S. & Weare, J. Learning Forecasts of Rare Stratospheric Transitions from Short Simulations. *Monthly Weather Review* **149**, 3647–3669. <https://journals.ametsoc.org/view/journals/mwre/149/11/MWR-D-21-0024.1.xml> (2021).
26. **Justin Finkel**, Abbot, D. S. & Weare, J. Path Properties of Atmospheric Transitions: Illustration with a Low-Order Sudden Stratospheric Warming Model. *Journal of the Atmospheric Sciences* **77**, 2327–2347. <https://journals.ametsoc.org/view/journals/atsc/77/7/jasD190278.xml> (2020).

27. Popović, P., **Finkel**, J., Silber, M. C. & Abbot, D. S. Snow Topography on Undeformed Arctic Sea Ice Captured by an Idealized “Snow Dune” Model. *Journal of Geophysical Research: Oceans* **125**, e2019JC016034. eprint: <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2019JC016034> (2020).
28. **Finkel**, J. M. & Katz, J. I. Changing world extreme temperature statistics. *International Journal of Climatology* **38**, 2613–2617. eprint: <https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/joc.5342> (2018).
29. **Finkel**, J. M. & Katz, J. I. Changing US extreme temperature statistics. *International Journal of Climatology* **37**, 4749–4755. eprint: <https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/joc.5115> (2017).
30. Kreisch, C., O’Sullivan, J., Arvidson, R., Politte, D., He, L., Stein, N., **J. Finkel**, Guinness, E., Wolff, M. & Lapôtre, M. Regularization of Mars Reconnaissance Orbiter CRISM along-track oversampled hyperspectral imaging observations of Mars. *Icarus* **282**, 136–151. ISSN: 0019-1035. <https://www.sciencedirect.com/science/article/pii/S0019103516301579> (2017).
31. **Finkel**, J. M., Canel-Katz, L. M. & Katz, J. I. Decreasing US aridity in a warming climate. *International Journal of Climatology* **36**, 1560–1564. eprint: <https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/joc.4421> (2016).

Awards & Honors

2025	Seed grant from the Institute for Climate and Sustainable Growth, University of Chicago, for the project AI-supercharged Climate Extreme Event Risk Assessment
2018-2022	Department of Energy Computational Science Graduate Fellowship
2017	Nishi Luthra award for “Outstanding students in the Physics department and the Philosophy department”
2017	<i>Sigma Pi Sigma</i> inductee (physics honor society)
2015	Academic Mentor of the Year (for physics mentoring)

Teaching & Mentorship

2025	Co-taught a short course in physics- an machine learning-based weather modeling at the University of Austin, together with PI Dorian Abbot.
2025-	Co-advising several graduate student projects on rare event sampling in climate models and machine learning interpretability.
2024-	Co-supervising undergraduate research project developing machine-learning emulator for stratospheric model with bistability and stochastic forcing.
2024-2025	Co-advised an undergraduate thesis and journal submission by Sarah Packman, Harvard University: “Using a rare event sampling technique to quantify extreme El Nino event statistics”
2024	Supervised an MIT Summer Research Project by Jesus Lopez, Texas AM San Antonio: “Spatiotemporal Dynamics and Rare Event Sampling of Local Extremes in Passive Tracer Distributions using Simplified Models”
2020	Developed and taught (together with faculty Mary Silber) an intensive online short course in linear algebra for incoming chemistry Ph.D. students at UChicago.

- 2017-2020 Online tutoring in math, physics, and programming at high school, undergraduate, and graduate level for students of widely varied backgrounds.
- 2014-2017 Worked with and led a team of mentors for introductory physics sequence at Washington University in St. Louis.

Last updated: July 31, 2026