ERIC T. WOLF, PH.D.

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Areas of Expertise:

Numerical Model Development | Computational Science Research | Quantitative Analysis
Data Visualization | Technical Writing | Public Speaking | AI Data Training

PROFESSIONAL EXPERIENCE

Laboratory for Atmospheric and Space Physics
University of Colorado at Boulder
Research Scientist in Climate and Space Sciences 2014 – Current

- Mastery of computing workflows, including research software development, numerical climate modeling on high performance supercomputers, data analysis, and data visualization
- Authored/co-authored 60+ peer reviewed science publications to date on topics of climate, planetary, and astronomical sciences, with 4400+ citations and high impact on the research community
- Authored/co-authored dozens of scientific proposals, leading to 18 awarded NASA grants in computational climate research, with total funding of $2.7 million brought into the University of Colorado
- Given 50+ public talks in variety of settings including scientific conferences, public lectures, and University seminars, with lengths up to 1 hour and attendances up to ~100+ audience members
- Extensive experience leading software development projects on GitHub involving the National Science Foundation National Center for Atmospheric Research's Community Earth System Model.
- Coordinates with ~10 research groups in supporting and using publicly available software on GitHub
- Adept at distilling complex concepts through data analysis, data visualization, and technical explanations
- Maintains high attention to detail and intensity in technical work and communications
- Experience in managing grants, including budgeting, report filings, meeting tight deadlines

Invisible Technologies
Advanced AI Data Trainer 2025 – Current

- Training of a public facing Large Language Model on STEM concepts and workflows

EDUCATION

University of Colorado at Boulder, Ph.D. Atmospheric and Oceanic Sciences (2014)
University of Colorado at Boulder, M.S. Atmospheric and Oceanic Sciences (2010)
University of Maryland, B.S. Astronomy (2007)

MEMBERSHIPS & ENGAGEMENTS

- Member, NASA Goddard Institute for Space Sciences, *ROCKE-3D Modeling Team*
- Member, University of Washington, *Virtual Planetary Laboratory*
- Member, Johns Hopkins University, *Consortium on Habitability and Atmospheres of M-dwarf Planets*
- Member NASA Goddard Space Flight Center, *Sellers Exoplanet Environments Collaboration*
- Scientific Publication Reviewer for: *The Astrophysical Journal, The Planetary Science Journal, Climates of the Past, Astrobiology, Earth and Planetary Science Letters, Nature Geoscience, Nature Astronomy, Scientific Reports, Climate Dynamics, Earth System Dynamics, Astronomy and Astrophysics*
- Scientific Proposal Reviewer for: NASA Habitable Worlds Program, NASA Solar System Observations Program, NASA Planetary Data Archiving Restoration and Tools Program, Future Investigators in NASA Earth and Space Science Technology Program, NASA Exoplanet Research Program, Israeli Ministry of Science and Technology Program, The Royal Society UK Physics and Earth Science Program

SKILLS

- Professional software and numerical modeling: Fortran, IDL, Python, GitHub, HPCC, 3D climate modeling (`CESM`, `ROCKE-3D`), radiative transfer modeling (`LBLRTM`, `HELIOS-K`, `SOCRATES`)
- Authored and support `ExoCAM` and `ExoRT` planetary atmosphere modeling packages
- Scientific research: climate, astronomy, radiative transfer, cloud and aerosol microphysics, fractal aggregates, planetary atmospheres, the habitable zone, deep time paleoclimate, extrasolar planets
- Educational: fundamental physics, mathematics, astrophysics, climate/weather
- Communication: technical writing, public speaking, distillation of complex ideas to simple terms

PUBLICATIONS

Statistics

First author papers: 13 Second author papers: 12 Other author papers: 39 Submitted/in prep papers: 7
Citations: 4533 h-index: 36 i10-index: 57

In preparation

[73] Lincowski, A.P., Meadows, V.S., Crisp, D., **Wolf, E.T.**, and Robinson, T.D. "Bridging Two Worlds: Introduction of a New Two-Column Climate Model for Terrestrial Exoplanet Studies and Application to JWST Observations of TRAPPIST-1 b and c." In preparation for Fall 2025 submission.

[72] Way, M.J., **Wolf, E.T.**, and Wilmes, S.-B. "Killing the Faint Young Sun Paradox: an exploration of Eoarchean climate." In preparation for Fall 2025 submission.

Submitted, in revision, or in press

[71] Haqq-Misra, J. and **Wolf, E.T.** "Maximum Lifetime of the Vegetative Biosphere." Submitted to *JGR-Atmospheres.*

[70] Wogan, N.F., Batalha, B.E., Zahnle, K., Krissansen-Totten, Catling, D.C., **Wolf, E.T.**, Robinson, T.D. Meadows, V., Arney, G., and Domagal-Goldman, S. "The Open-Source Photochem Code: A General Chemical and Climate Model for Interpreting (Exo)Planet Observations." Accepted at *The Planetary Science Journal.*

[69] Yang, H., **Wolf, E.T.**, Liu, C.-C. Zhan, Y., Toon, O.B., and Abbot, D.S. "The effect of planetary rotation period on clouds in a GCM with a bin microphysics model." Submitted to *The Astrophysical Journal.*

[68] Airapetian, V., Kobayashi, K., Udo, T., Mouri, S., Kebukawa, Y., Fukuda, H., Oguri, Y., Way, M., Gronoff, G., and **Wolf, E.T.** "Production Rates of Nitrous Oxide and Biomolecules in Primitive Atmospheres of Early Earth and Rocky Exoplanets." Submitted to *Nature Astronomy.*

[67] Fuji, Y., Angerhausen, D., Matsuo and **Wolf, E.T.** "Probing thermal gradient of habitable-zone rocky planets with direct imaging as an anti-indicator of global surface ocean." Submitted to *The Astrophysical Journal*

First author refereed

[66] **Wolf, E.T.**, Schwieterman, E.W., Haqq-Misra, J., Fauchez, T.J., et al. (2025) "Chemistry, Climate, and Transmission Spectra of Transmission Spectra of TRAPPIST-1e Explored with a Multimodel Sparse Sampled Ensemble." *The Planetary Science Journal* 6:231 (30pp), https://doi.org/10.3847/PSJ/ae031e

[65] **Wolf, E.T.**, Kopparapu, R., Haqq-Misra, J. and Fauchez, T.J. (2022) "ExoCAM: A 3D Climate Model for Exoplanet Atmospheres." *The Planetary Science Journal THAI Focus Issue*, 3:7 (17pp), https://doi.org/10.3847/PSJ/ac3f3d

[64] **Wolf, E.T.**, Haqq-Misra, J., Kopparapu, R.K., Fauchez, T., Welsh, W.F., Kane, S.R., Kostov, V., and Siegfried, E. (2020) "The Resilience of Habitable Climates Around Circumbinary Stars." *J. Geophys. Res. Planets.* 125, e2020JE006576, https://doi.org/10.1029/2020JE006576

[63] **Wolf, E.T.**, Kopparapu, R.K., and Haqq-Misra, J. (2019) "Simulated Phase Dependent Water Vapor and Cloud Spectra of Synchronously Rotating Aquaplanets." *The Astrophysical Journal* 877:35 (18 pp), https://doi.org/10.3847/1538-4357/ab184a

[62] **Wolf, E.T.**, Haqq-Misra, J., and Toon, O.B. (2018) "Evaluating Climate Sensitivity to CO_2 Across Earth's History." *JGR-Atmospheres*, 123, 21, 11861-11874, https://doi.org/10.1029/2018JD029262

[61] **Wolf, E.T.** (2017) "Assessing the Habitability of the TRAPPIST-1 System Using a 3D Climate Model." *The Astrophysical Journal Letters* 839:L1 (6pp), https://doi.org/10.3847/2041-8213/aa693a

[60] **Wolf, E.T.**, Shields, A.L., Kopparapu, R.K., Haqq-Misra, J., and Toon, O.B. (2017) "Constraints on Climate and Habitability for Earth-like Exoplanets Determined from a General Circulation Model." *The Astrophysical Journal* 837:107 (11pp), https://doi.org/10.3847/1538-4357/aa5ffc

[59] **Wolf, E.T.** and Toon, O.B. (2015) "The evolution of habitable climates under the brightening Sun." *JGR-Atmospheres* 120(12) 5775-5794, https://doi.org/10.1002/2015JD023302

[58] **Wolf, E.T.** and Toon, O.B. (2014) "Controls on the Archean climate system investigated with a global climate model." *Astrobiology* 14(3) 241-252, https://doi.org/10.1089/ast.2013.1112

[57] **Wolf, E.T.** and Toon, O.B. (2014) "Delayed onset of runaway and moist greenhouse climates for Earth." *Geophys. Res. Lett.* 41, 1, 167-172, https://doi.org/10.1002/2013GL058376

[56] **Wolf, E.T.** and Toon, O.B. (2013) "Hospitable Archean Climates Simulated by a General Circulation Model." *Astrobiology* 13(7) 1-18, https://doi.org/10.1089/ast.2012.0936

[55] **Wolf, E.T.** and Toon O.B. (2010) "The Hazy Details of Early Earth's Atmosphere Response." *Science* 330, 754-755, https://www.science.org/doi/10.1126/science.330.6005.754-b

[54] **Wolf, E.T**. and Toon O.B. (2010) "Fractal Organic Hazes Provided an Ultraviolet Shield for Early Earth." *Science* 328, 1266-1268, https://www.science.org/doi/10.1126/science.1183260

Second author refereed

[53] Shields, A.L., **Wolf, E.T.**, Agol, E., and Tremblay, P.E. (2025) "Increased Surface Temperatures of Habitable White Dwarf Worlds Relative to Main-sequence Exoplanets." *The Astrophysical Journal,* 979:45 (13 pp), https://doi.org/10.3847/1538-4357/ad9827

[52] Haqq-Misra, J., **Wolf, E.T.**, Fauchez, T.J., and Kopparapu, R.K. (2024) "Interpolation and synthesis of sparse samples in exoplanet atmospheric modeling." *The Planetary Science Journal* 5, 140, https://doi.org/10.3847/PSJ/ad50a7

[51] Haqq-Misra, J., **Wolf, E.T.**, Fauchez, T.J., Shields, A.L., and Kopparapu, R.K. (2022) "The SparseAtmospheric Model Sampling Analysis (SAMOSA) Intercomparison: Motivations and Protocol version 1.0: A CUISINES Model Intercomparison." *The Planetary Science Journal* 3:260 (10pp), https://doi.org/10.3847/PSJ/ac9479

[50] Suissa G., **Wolf, E.T.**, Kopparapu, R.k., Villanueva, G.L., Fauchez, T., Mandell, A.M., Arney, G., Gilbert, E.A., Schlieder, J.E., Barclay, T., Quintana, E.V., Lopez, E.D., Rodriguez, J.E., and Vanderburg, A. (2020) "The First Habitable Zone Earth-size Planet from TESS. III: Climate States and Characterization Prospects for TOI-700 d." *The Astronomical Journal*, 160:118 (19pp), https://doi.org/10.3847/1538-3881/aba4b4

[49] Charnay, B., **Wolf, E.T.,** Marty, B. and Forget, F. (2020) "Is the Faint Young Sun Paradox for Earth Solved?" *Space Science Reviews* 216:90, https://doi.org/10.1007/s11214-020-00711-9

[48] Haqq-Misra, J., **Wolf, E.T.**, Welsh, W., Kopparapu, R., Kostov, V., and Kane, S. (2019) "Constraining the Magnitude of Climate Extremes From Time-Varying Installation on a Circumbinary Terrestrial Planet." *Journal of Geophysical Research: Planets* 124, 12, 3231-3243, https://doi.org/10.1029/2019JE006222

[47] Chen, H., **Wolf, E.T.**, Zhan, Z., and Horton, D.E. (2019) "Habitability and Spectroscopic Observability of Warm M-dwarf Exoplanets Evaluated with a 3D Chemistry-Climate Model." *The Astrophysical Journal* 886:16, https://doi.org/10.3847/1538-4357/ab4f7e

[46] Badhan, M.A., **Wolf, E.T.**, Kopprapu, R.K., Kempton, E.M.-R., Arney, G., Domagal-Goldman, S.D., and Deming, D. (2019) "Stellar Activity Effects on Moist Habitable Terrestrial Atmospheres." *The Astrophysical Journal* 887:34 (11pp), https://doi.org/10.3847/1538-4357/ab32e8

[45] Chen, H, **Wolf, E.T.**, Kopparapu, R., Domagal-Goldman, S., and Horton, D.E. (2018) "Biosignature Anisotropy Modeled on Temperate Tidally-Locked M-dwarf Planets." *The Astrophysical Journal Letters*, 868:L6, https://doi.org/10.3847/2041-8213/aaedb2

[44] Haqq-Misra, J., **Wolf, E.T.**, Joshi, M., Zhang, X., and Kopparapu, R.K. (2018) "Demarcating circulation regimes of synchronously rotating terrestrial planets within the habitable zone." *TheAstrophysical Journal* 852:67 (16 pp), https://doi.org/10.3847/1538-4357/aa9f1f

[43] Kopparapu, R.K., **Wolf, E.T.**, Arney, G., Batalha, N., Haqq-Misra, J., Grimm, S.L. and Heng, K. (2017) "Habitable Moist-Greenhouse Atmospheres Around Low Mass Stars." *The Astrophysical Journal* 845:5 (16pp), https://doi.org/10.3847/1538-4357/aa7cf9

[42] Kopparapu, R.K., **Wolf, E.T.**, Haqq-Misra, J., Yang, J., Kasting, J.F., Meadows, V., Terrien, R., and Mahadevan, S. (2016) "The Inner Edge of the Habitable Zone for Synchronously Rotating Planets Around Low Mass Stars Using General Circulation Models." *The Astrophysical Journal* 819:84 (14pp), https://doi.org/10.3847/0004-637X/819/1/84

Other author refereed

[41] Goodis Gordon, K.E., Karalidi, T., Bott, K.M., Vancil, J., Millar-Blanchaer, M.A., Wogan, N.F., and **Wolf, E.T.** (2025) "Polarized Signatures of Variable Worlds: Modeling Heterogeneous Habitable Earth- and Early Mars-like (Exo)planets." *The Astrophysical Journal*, 993:36 (16pp), https://doi.org/10.3847/1538-4357/ae07df

[40] Beard, C., Robertson, P., Lubin, J., Mahadevan, S., Stefansson, G., Wright, J.T., **Wolf, E.T.**, et al. (2025) "Discovery of a Nearby Habitable Zone Super-Earth Candidate Amenable to Direct Imaging." *The Astrophysical Journal* 170:279 (27pp) https://doi.org/10.3847/1538-3881/ae0e20

[39] Tsigaridis, K., Ackerman, A.S., Aleinov, I., Chandlar, M.A., Clune, T.L., Colose, C.M., Del Genio, A.D., Kelley, M., Kiang, N., Leboisseteir, A., Perlwitz, J.P., Ruedy, R.A., Russell, G.L., Sohl, L.E., Way, M.J., and **Wolf, E.T.** (2025)

"ROCKE-3D 2.0: an updated general circulation model for simulating the climates of rocky planets." *Geoscientific Model Development* 18, 5825-5871, https://doi.org/10.5194/gmd-18-5825-2025

[38] Hammond, T., Komacek, T.D., Kopparapu, R., Fauchez, T.J., Mandell, A., Wolf, E.T., Kofman, V., Kane, S.R., Johnson, T.M., Desai, A., Arney, G., and Crouse, J. (2025) "The climates and thermal emission spectra of prime nearby temperate rocky exoplanet targets." *The Planetary Science Journal*, 984:181 (16pp), https://doi.org/10.3847/1538-4357/adc73b

[37] Deitrick, R., Goldblatt, C., **Wolf, E.T.**, and Robinson, T.D. (2025) "Oxidizing ExoCAM: Introducing the Radiative Effects of Oxygen and Ozone into the ExoCAM General Circulation Model." *The Planetary Science Journal*, 6:8 (15pp), https://doi.org/10.3847/psj/ad9900

[36] Venkatesan, V., Shields, A.L., Deitrick, R., **Wolf, E.T.**, and Rushby, A. (2025) "A One- Dimensional Energy Balance Model Parameterization for the Formation of CO2 Ice on the Surfaces of Eccentric Extrasolar Planets." *Astrobiology*, 25, 1, https://doi.org/10.1089/ast.2023.0103

[35] Yang, H., Komacek, T.D., Toon, O.B., **Wolf, E.T.**, Robinson, T.D., Chael, C., and Abbot, D.S. (2024) "Impact of Planetary Parameters on Water Cloud Microphysics." *The Astrophysical Journal*, 966, 152, https://doi.org/10.3847/1538-4357/ad3242

[35] Eager-Nash, J.K., Mayne, N.J., Nicholson, A.E., Prins, J.E., Young, O.C.F., Daines, S.J., Sergeev, D.E., Lambert, F.H., Manners, J., Boutle, I.A., **Wolf, E.T.**, Kamp, I.E.E., Kohary, K. and Lenton, T.M. (2023) "3D climate simulations of the Archean find that methane has a strong cooling effect at high concentrations." *JGR-Atmospheres,* 128, e2022JD037544, https://doi.org/10.1029/2022JD037544

[34] Lobo, A.H., Shields, A.L, Palubski, I.Z., and **Wolf, E.T.** (2023) "Terminator Habitability: The Case for Limited Water Availability on M-dwarf Planets." *The Astrophysical Journal.* 945:161 (13pp), https://doi.org/10.3847/1538-4357/aca970

[33] Kossakowski, D. Kurster, M., Trifonov, T. et al. including **Wolf, E.T.** (2023) "The CARMENES search for exoplanets around M dwarfs. Wolf 1069 b: Earth-mass planet in the habitable zone of a nearby very low mass star." *Astron. & Astrophys.* 670, A84, https://doi.org/10.1051/0004-6361/202245322

[32] Christie, D.A., Lee, E.K.H., Innes, H., Noti, P.A., Charnay, B. et al. including **Wolf, E.T.** (2022) "CAMEMBERT A Mini-Neptunes GCM Intercomparison, Protocol Version 1.0. A CUISINES Model Intercomparison Project." *The Planetary Science Journal*, 3, 261, https://doi.org/10.3847/PSJ/ac9dfe

[31] Turbet, M., Fauchez, T.J., Sergeev, D.E., Boutle, I.A., Tsigaridis, K., Way, M.J., **Wolf, E.T.,** Domagal-Goldman, S.D., Forget, F., Haqq-Misra, J., Kopparapu, R.K., Lambert, F.H., Manners, J., Mayne,N.J., and Sohl, L. (2022) "The TRAPPIST-1 Habitable Atmosphere Intercomparison (THAI). Part I: Dry Cases – The fellowship of the GCMs." *The Planetary Science Journal* 3:211 (17pp), https://doi.org/10.3847/PSJ/ac6cf0

[30] Sergeev, D.E., Fauchez, T.J., Turbet, M., Boutle, I.A., Tsigaridis, K., Way, M.J., **Wolf, E.T.**, Domagal-Goldman, S.D., Forget, F., Haqq-Misra, J., Kopparapu, R.K., Lambert, F.H., Manners, J., and Mayne, N.J. (2022) "The TRAPPIST-1 Habitable Atmosphere Intercomparison (THAI). Part II: Moist Cases – The Two Waterworlds." *The Planetary Science Journal*, 3:212 (26pp), https://doi.org/10.3847/PSJ/ac6cf2

[29] Fauchez, T.J., Villaneuva, G. Sergeev, D.E., , Turbet, M., Boutle, I.A., Tsigaridis, K., Way, M.J., **Wolf, E.T.**, Domagal-Goldman, S.D., Forget, F., Haqq-Misra, J., Kopparapu, R.K., Lambert, F.H., Manners, J., and Mayne, N.J. (2022) "The TRAPPIST-1 Habitable Atmosphere Intercomparison (THAI). Part III: Simulated Observables – The return of the spectrum." *Planetary Science Journal* 3:213 (17pp), https://doi.org/10.3847/PSJ/ac6cf1

[28] Vidaurri, M.R., Bastelberger, S.T., **Wolf, E.T.**, Domagal-Goldman, S., Kopparapu, R.K. (2022) "The Outer Edge of the Venus Zone Arouund Main Sequence Stars." *The Planetary Science Journal*, 3, 137, https://doi.org/10.3847/PSJ/ac68e2

[27] Guzewich, S. Way, M., Aleinov, I., **Wolf, E.T.**, Del Genio, A.D., Wordsworth, R., & Tsigaridis, K. (2021) "3D Simulations of the Early Martian Hydrological Cycle Mediated by a H_2-CO_2 Greenhouse." *Journal of Geophysical Research: Planet*, 126, e2021JE006825, https://doi.org/10.1029/2021JE006825

[26] Colose, C., Haqq-Misra, J., Del Genio, A.D., Barnes, A.D., **Wolf, E.T.**, Way, M., & Ruedy, R. (2021) "Effects of Spin-Orbit Resonances and Tidal Heating on the Inner Edge of the Habitable Zone." *The Astrophysical Journal*, 921:25 (33pp), https://doi.org/10.3847/1538-4357/ac135c

[25] Fauchez, T., Turbet, M., Sergeev, D., et al. including **Wolf, E.T.** (31 authors total). (2021) "TRAPPIST Habitable Atmosphere Intercomparison (THAI) workshop report." *The Planetary ScienceJournal THAI Focus Issue*, 2:106 (28pp), https://doi.org/10.3847/PSJ/abf4df

[24] Kane, S.R., Li, Z., **Wolf, E.T.**, Osterberg, C. and Hill, M.L. (2021) "Eccentricity Driven Climate Effect in the Kepler-1649 System." *The Astronomical Journal*, 161:31 (9pp), https://doi.org/10.3847/1538-3881/abcbfd

[23] Rushby, A.J., Shields, A.L., **Wolf, E.T.**, Lague, M., and Burgasser, A. (2021) "The Effect of Land-Albedo Feedback on the climate of Land-Dominated Planets in the TRAPPIST-1 System." *The Astrophysical Journal,* 904:124 (14pp), https://doi.org/10.3847/1538-4357/abbe04

[22] Chen, H., Zhan, Z, Youngblood, A., **Wolf, E.T.**, Feinstein, A.D and Horton, D.E. (2021) "Persistence of Flare-Driven Atmospheric Chemistry on Rocky Habitable Zone Worlds." *Nature Astronomy* 5, 298-310, https://doi.org/10.1038/s41550-020-01264-1

[21] Turbet, M., Bolmont, E., Bourrier, V., Demory, B.-O., Leconte, J. and **Wolf, E.T.** (2020) "A Review of Possible Planetary Atmospheres in the TRAPPIST-1 System." *Space Science Reviews*, 216, 100, https://doi.org/10.1007/s11214-020-00719-1

[20] Gilbert, E.W., Barclay, T., Schlieder, J.E., Quintana, E.V., Hord, B.J., Kostov, V.B., Lopez, E.D. et al., including **Wolf, E.T.** (2020) "The First Habitable Zone Earth-size Planet from TESS. I: Validation of the TOI-700 System." *The Astronomical Journal*, 160, 3, https://doi.org/10.3847/1538-3881/aba4b2

[19] Kostov, V.B., Orosz, J.A., Feinstein, A.D., Welsh, W.F., Cukier, W. et al., including **Wolf, E.T.** (2020) "TOI-1338: TESS' First Transiting Circumbinary Planet." *The Astronomical Journal*, 159, 253 (26pp), https://doi.org/10.3847/1538-3881/ab8a48

[18] Suissa, G., Mandell, A., **Wolf, E.T.,** Villanueva, G.L., Fauchez, T., and Kopparapu, R. (2020) "Dim Prospects for Transmission Spectra of Ocean Earths Around M Stars." *The Astrophysical Journal* 891, 57, https://doi.org/10.3847/1538-4357/ab72f9

[17] Fauchez, T., Turbet, M, **Wolf, E.T.**, Boutle, I., Way, M.J., Del Genio, A.D., Mayne, N.J., Tsigaridis, K., Kopparapu, R.K., Yang, J., Forget, F., Mandel, A., and Domagal-Goldman, S.D. (2020) "TRAPPIST-1 Habitable Atmosphere Intercomparison (THAI): motivations and protocol version 1.0." *Geosci. Model Dev.*, 13, 707–716, https://doi.org/10.5194/gmd-13-707-2020

[16] Komacek, T., Fauchez, T., **Wolf, E.T.,** and Abbot D.S. (2020) "Clouds will likely prevent the detection of water vapor in JWST transmission spectra of terrestrial exoplanets." *The Astrophysical Journal* 888:L20 (6pp), https://doi.org/10.3847/2041-8213/ab6200

[15] Hu, R., Peterson, L, and **Wolf, E.T.** (2020) "O_2 and CO-rich Atmospheres for Potentially Habitable Environments on TRAPPIST-1 Planets." *The Astrophysical Journal* 888:122 (15pp), https://doi.org/10.3847/1538-4357/ab5f07

[14] Fauchez, T., Turbet, M, Villanueva, G.L., **Wolf, E.T.**, Arney, G., Kopparapu, R.K., Lincowski, A., Mandell, A., deWit, J., Pidhorodetska, D., Domagal-Goldman, S.D., and Stevenson, K.B. (2019) "Impact of Clouds and Hazes in the Simulates JWST Transmission Spectra of Habitable Planets in the TRAPPIST-1 System." *The Astrophysical Journal* 887:194, https://doi.org/10.3847/1538-4357/ab5862

[13] Cukier, W., Kopprarapu, R., Kane, S.R., Welsh, W., **Wolf, E.T.**, Kostov, V., and Haqq-Misra, J. (2019) "Habitable Zone Boundaries for Circumbinary Planets." *Publications of the Astronomical Society of the Pacific* 131:124402 (5pp), https://doi.org/10.1088/1538-3873/ab50cb

[12] Komacek, T.D., Jansen, M.F., **Wolf, E.T.**, and Abbot, D.S. (2019) "Scaling Relations for Terrestrial Exoplanet Atmospheres from Baroclinic Criticality." *The Astrophysical Journal* 883:46 (8pp), https://doi.org/10.3847/1538-4357/ab3980

[11] Yu, P., Toon, O.B., Bardeen, C.G., Zhu, Y., Rosenlof, K.H., Portmann, R.W., Thornberry, T.D., Gao, R.-S., Davis, S.M., **Wolf, E.T.**, de Gouw, J., Peterson, D.A., Fromm, M.D., and Robock, A. (2019) "Black carbon lofts wildfire smoke high in to the stratosphere to form a persistent plume." *Science* 365, 587-590, https://doi.org/10.1126/science.aax1748

[10] Aleinov, I., Harman, C., Tsigardis, C., Way, M.J., **Wolf, E.T.**, and Gronoff, G. (2019) "Modeling a Transient Secondary Paleolunar Atmosphere: 3-D Simulations and Analysis" *Geophysical Research Letters* 46, 10, 5107-5116, https://doi.org/10.1029/2019GL082494

[9] Yang, J., Leconte, J., **Wolf, E.T.**, Merlis, T., Koll, D.D.B., Forget, F., and Abbot, D.S. (2019) "Simulations of Water Vapor and Clouds on Rapidly Rotating and Tidally Locked Planets: A 3D Model Intercomparison." *The Astrophysical Journal* 875, 46, https://doi.org/10.3847/1538-4357/ab09f1

[8] Adams, A.D., Boos, W.R. and **Wolf, E.T.** (2019) "Aquaplanet Models on Eccentric Orbits: Effects of Rotation Rate on Observables." *The Astrophysical Journal* 157,189, https://doi.org/10.3847/1538-3881/ab107f

[7] Haqq-Misra, J., Kopparapu, R.K., and **Wolf, E.T.** (2017) "Why do we find ourselves around a yellow star instead of a red star?" *International Journal of Astrobiology* 1-10, https://doi.org/10.1098/rsta.1983.0096

[6] Arney, G., Meadows, V.S., Domagal-Goldman, S.D., Deming, D., Robinson, T., Tovar, G., **Wolf, E.T.**, and Schwieterman, E. (2017) "Pale Orange Dots: The Detectability of Organic Haze on Earthlike Exoplanets." *The Astrophysical Journal* 836:49 (19pp), https://iopscience.iop.org/article/10.3847/1538-4357/836/1/49

[5] Arney, G., Domagal-Goldman, S., Meadows, V., **Wolf, E.T.**, Schwieterman, E., and Claire, M. "The PaleOrange Dot: The Spectrum and Climate of Hazy Archean Earth." (2016) *Astrobiology* 16(11), 1-27, https://doi.org/10.1089/ast.2015.1422

[4] Yang, J., Leconte, J., **Wolf, E.T.**, Goldblatt, C., Feldl, N., Merlis, T., Wang, Y., Koll, D.D.B., Ding, F., Forget, F., Toon, O.B., and Abbot, D.S. (2016) "Differences in Water Vapor Radiative Transfer Among 1D Models Can Significantly

Affect the Inner Edge of the Habitable Zone." *The Astrophysical Journal* 826:222 (11pp), https://iopscience.iop.org/article/10.3847/0004-637X/826/2/222

[3] Harman, C.E., Kasting, J.F. and **Wolf, E.T.** (2013) "Atmospheric Production of Glycolaldehyde Under Hazy Prebiotic Conditions." *Origins of Life and Evolution of Biospheres* 43 77-98, https://doi.org/10.1007/s11084-013-9332-7

Other written works

[2] **Wolf, E.T.**, Kopparapu, R.K., Airapetian, V., Fauchez, T., Guzewich, S., Kane, S.R., Pidhorodetska, D.,Way, M.J. and 22 co-signors. (2020) "The Importance of 3D General Circulation Models for Characterizing the Climate Habitability of Terrestrial Extrasolar Planets." *Astro2020 Science White Paper*, https://arxiv.org/abs/1903.05012

[1] Kopparapu, R.K., **Wolf, E.T.**, and Meadows, V.S. (2020) "Characterizing Exoplanet Habitability." Book Chapter in *Planetary Astrobiology*, University of Arizona Press, Space Science Series, https://arxiv.org/abs/1911.04441

AWARDED PROJECTS

[18] "Exploring the Influence of Hazes on Climate and Spectra of Small Planets Around FGK Stars." (2025 – 2028) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $182, 381

[17] "The Virtual Planetary Laboratory: Advancing the Search for Life on Exoplanets." (2023 – 2028) NASA ICAR Program, *Institutional PI/Project Co-I,* $125,000

[16] "Strange New Worlds: Characterizing Nearby M-dwarf Habitable Zone Planets." (2023 – 2028) NASA ICAR Program, *Institutional PI/Project Co-I*, $400,000

[15] "Detectability of water in the atmosphere of terrestrial habitable zone exoplanets due to exo-volcanism: a false positive for habitability." (2023 – 2026) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $110,000

[14] "Photochemistry in TESS's First Habitable Zone Terrestrial Planet, TOI-700d." (2021 – 2025) Space Telescope Science Institute HST Cycle 28-GO, *Institutional PI/Project Co-I*, $45,000

[13] "The M-dwarf Opportunity: Characterizing Nearby M-dwarf Habitable Zone Planets in the Solar Neighborhood." (2021 – 2025) NASA Interdisciplinary Consortia for Astrobiology Research, *Institutional PI/Project Co-I*, $183,299

[12] "A Cloudy Greenhouse Solution for a Habitable Ancient Mars." (2020 – 2024) NASA Habitable Worlds Program, *PI*, $276,308

[11] "The Effect of Cloud Microphysics on the Climate and Observational Prospects of Potentially Habitable Exoplanets." (2022 – 2025) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $199,427

[10] "3-D Modeling of a Secondary Ancient Lunar Atmosphere: The Effect on Volatile Distribution." (2021 – 2024) NASA Solar Systems Workings Program, *Institutional PI/Project Co-I*, $39,235

[9] "The Virtual Planetary Laboratory: Advancing the Search for Life Beyond the Solar System." (2018 – 2024) NASA Astrobiology Institute, *Institutional PI/Project Co-I*, $156,186

[8] "Abrupt Climate Transitions Near Habitability Thresholds Investigated With ROCKE-3D and SOCRATES." (2017 – 2023) NASA Astrobiology Institute, *Institutional PI/Project Co-I*, $249,000

[7] "Simulating Climate, Transit Spectra, and Phase Curves of Sub-Neptunes With H_2-Atmospheres." (2021 – 2024) NASA Sellers Exoplanet Environments Collaboration, *Institutional PI/Project Co-I*, $123,000

[6] "Determining the Atmospheric Composition and Rotation Rates of Habitable Zone M-dwarf Planets with Thermal Phase Curves and Transit Spectra." (2018 – 2019) NASA Sellers Exoplanet Environments Collaboration, *Institutional PI/Project Co-I*, $43,483

[5] "Constraining the Habitable Zone for Binary Star Systems." (2017 – 2020) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $112,480

[4] "Organic Habitable Worlds: Simulating Habitable Zones for Organic-Rich Atmospheres." (2017- 2020) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $106,243

[3] "Determining the Inner Edge of the Habitable Zone Around M-Dwarf Stars Using 3-D Climate Models." (2016 – 2017) NASA Habitable Worlds Program, *Institutional PI/Project Co-I*, $137,308

[2] "Constraining exoplanet climates and habitability using three-dimensional climate models." (2014 – 2017) NASA Planetary Atmospheres Program, *Science-PI*, $464,045

[1] "A 3D Coupled Climate Simulation Investigating the Faint Young Sun Paradox." (2010 – 2013) NASA Earth and Space Science Fellowship, *Graduate Student*, $90,000

CONFERENCE TALKS

[35] **Wolf, E.T.**, Haqq-Misra, J., Schwieterman, E., Fauchez, T., Kopparapu, R., Mandell, A., Komacek, T, Hammond, T., and Kofman, V. "Thermal Emission Phase Curves of Disparate Terrestrial Exoplanets: Results from 3D climate models with focus on TRAPPIST-1 e." *Atmospheric Characterization of Rocky to Giant Exoplanets in Thermal Emission with JWST*. Aspen, CO, April 1st, 2025

[34] **Wolf, E.T. "**Lifting the veil on hazes in planetary atmospheres through modeling and observation." (invited) *American Association for Aerosol Research Annual Conference*, Albuquerque, NM, Oct 23, 2024

[33] **Wolf, E.T.** "Modeling Photochemical Hazes in 3D: from the Archean to Exoplanets." *NASA ROCKE-3D Team Meeting*, New York, NY, Sept 24, 2024

[32] **Wolf, E.T.**, Bastelberger, S., Fauchez, T.J., Schwieterman, E., et al. "Model Hazes in Exoplanet Atmospheres with a General Circulation Model Coupled to a Size Resolved Microphysical Model with Self-Consistent Photochemical Inputs." *Astrobiology Science Conference*, Providence, RI, May 6, 2024

[31] **Wolf, E.T. "**SOCRATES: Suite Of Community Radiative Transfer codes based on Edwards and Slingo." *NASA ROCKE-3D Team Meeting*, Feb 13th, 2023

[30] **Wolf, E.T.**, "ExoCAM: A 3D Climate model for Exoplanet Atmospheres." *NASA EMAC Workshop*, Virtual, Feb 8, 2023.

[29] **Wolf, E.T.**, Kopparapu, R., Mandel, A., and Suissa, G. "Simulating Climate, Transit Spectra, and Phase Curves of Sub-Neptunes with H_2 Atmospheres Around M-dwarfs." *NASA Sellers Exoplanet Environments Collaboration Retreat*, Virtual, Feb 1st, 2022

[28] **Wolf, E.T.** "ExoCAM: An extension to CESM1.2.1 for simulating exoplanet atmospheres." *CESM Annual Workshop*, Virtual, June 16th, 2021

[27] **Wolf, E.T.**, Kopparapu, R., Mandel, A., and Suissa, G. "3-D Modeling of H_2-rich Super-Earths/mini-Neptunes." *NASA Sellers Exoplanet Environments Collaboration Retreat*, Virtual, Feb 9th, 2021

[26] **Wolf, E.T.** "The Resilience of Habitable Climates Around Circumbinary Stars." *American Geophysical Union Fall Meeting*, Virtual, December 2020

[25] **Wolf, E.T.** "The NCAR Community Earth System Model: Applications to Exoplanetary Atmospheres with the ExoCAM extension." *TRAPPIST Habitable Atmospheres Intercomparison Workshop*. Virtual, Sept 14-16, 2020

[24] **Wolf, E.T.**, Kopparapu, R.K., and Haqq-Misra, J. "ExoCAM: An Exoplanet Extension to the NCAR Community Earth System Model." *SEEC Symposium 2019, Rocky Exoplanets in the Era of JWST: Theory and Observation.* Greenbelt, MD, Nov 4-8, 2019

[23] **Wolf, E.T.,** Kopparapu, R.K., and Haqq-Misra, J. "Simulated Phase Dependent Spectra of Terrestrial Aquaplanets in M-dwarf Systems." *Astrobiology Science Conference 2019*. Bellevue, WA, June 25th, 2019

[22] **Wolf, E.T.** "The Mark of a Habitable World: Water Vapor, Clouds, and Sea Ice." *ROCKE-3D Team Meeting*, New York, NY, May 23, 2019

[21] **Wolf, E.T.** "Climate, runaway greenhouse, and cold trapping on tidally locked planets." (invited) *Understanding The Diversity of Planetary Atmospheres*. Europlanet & International Space Sciences Institute Workshop, Bern, Switzerland Nov 12 – 16, 2018

[20] **Wolf, E.T.** "3D Terrestrial Exoplanet Modeling With the NCAR Community Climate Model." *ROCKE-3D Team Meeting,* New York, NY, May 23, 2018

[19] **Wolf, E.T.** "Climate and Habitability of Earth-like Extrasolar Planets." (invited) *Sun-Climate Symposium*, Lake Arrowhead, CA, Mar 19 – 23, 2018

[18] **Wolf, E.T.** "The theory of climate and habitability for M-dwarf temperate worlds." (invited) *Habitable Worlds 2017: A System Science Workshop*, Laramie WY, Nov 13 – 17, 2017

[17] **Wolf, E.T.**, Gatlin, D., Kopparapu, R.K., Haqq-Misra, J.H., and Villanueva, G. "Observational Signals of TRAPPIST-1e Derived From a 3D Climate Model." *Habitable Worlds 2017: A System Science Workshop*, Laramie, WY, Nov 13–17, 2017

[16] **Wolf, E.T.** and Toon, O.B. "Non-linear dependence of equilibrium climate sensitivity on CO_2, temperature, and solar insolation: implications for Earth's climate history and future." *Astrobiology Science Conference 2017*, Mesa, AZ, April 24 – 28, 2017

[15] **Wolf, E.T.**, Kopparapu, R.K., and Haqq-Misra, J. "New definitions of the inner edge of the habitable zone around M-dwarf stars." *American Geophysical Union Fall Meeting 2016*, San Francisco, CA Dec. 12th – 16th, 2016

[14] **Wolf, E.T.,** Kopparapu, R.K., Haqq-Misra, J., and Toon, O.B. "3D climate simulations of synchronously rotating Earth-like planets around M-dwarf stars. *Dynamical Core Model Intercomparison Workshop*, Boulder, CO June 6 – 17, 2016

[13] **Wolf, E.T.**, Kopparapu, R.K.., Haqq-Misra, J., and Toon, O.B**.** "From snowball to moist greenhouse: the climatological evolution of Earth-analog planets simulated with a 3D climate system model." *Extreme Solar Systems III*. Waikoloa Beach, HI, Nov 29 – Dec 4, 2015

[12] **Wolf, E.T.**, and Toon, O.B. "Stratospheric clouds, convection and water vapor in the moist greenhouse climate." *SPARC Regional Workshop*. Boulder, CO November 2015

[11] **Wolf, E.T.**, Kopparapu, R.K., Haqq-Misra, J., Yang, J., Abbot, D.S., and Toon, O.B. "Atmospheres near the inner edge of the habitable zone." *NCAR Geoenginnering Early Career Workshop*. Boulder, CO, July 20 – 24, 2015

[10] **Wolf, E.T.**, Kopparapu, R.K., Haqq-Misra, J., and Toon, O.B. "Refining the inner edge of the habitable zone using 3D climate models." *Pathways 2015: Pathways to Habitability,* Bern, Switzerland, July 13th, 2015

[9] **Wolf, E.T.**, Kopparapu, R.K., Haqq-Misra, J., and Toon, O.B. "3D Climate Simulations of Terrestrial Atmospheres Near the Inner Edge of the Habitable Zone Around F, G and K Stars." *Astrobiology Science Conference.* Chicago, Ill. June 16, 2015

[8] **Wolf, E.T.** and Toon, O.B. "A three-dimensional climate simulations of moist greenhouse atmospheres." *American Geophysical Union Fall Meeting.* San Francisco, CA, Dec 19, 2014

[7] **Wolf, E.T.** and Toon, O.B. "Is the faint young Sun paradox solved?" *American Geophysical Union Fall Meeting.* San Francisco, CA, Dec 10, 2013

[6] **Wolf, E.T.** and Toon, O.B., "Can waterbelt states resolve the Faint Young Sun paradox?" *American Geophysical Union Fall Meeting.* San Francisco, CA, Dec 3, 2012

[5] **Wolf, E.T.** and Toon, O.B. "Modeling Precambrian Climate with CAM3.0: Resolving the Faint Young Sun Paradox." *17th Annual CESM Workshop.* Breckenridge, CO, Jun 19, 2012

[4] **Wolf, E.T.** and Toon, O.B. "A Coupled General Circulation Model of the Archean Earth." *American Geophysical Union Fall Meeting.* San Francisco, CA, Dec 5, 2011

[3] **Wolf, E.T.**, Toon O.B. and Tian F. "Fractal Organic Hazes: Implications for the Archean." *Goldschmidt Conference.* Prague, CZ, Aug 16, 2011

[2] **Wolf, E.T.**, Toon O.B. and Tian F., "Fractal Organic Hazes: Implications for the Archean." *American Geophysical Union Fall Meeting.* San Francisco, CA, Dec 13, 2010

[1] **Wolf, E.T**. and Toon, O.B. "A Fractal Aggregate Model of Early Earth Organic Hazes: UV shielding with minimal antigreenhouse cooling." *Astrobiology Science Conference.* League City, TX, Apr 28, 2010

SEMINARS AND LECTURES

"A large ensemble of chemistry and climate simulations for terrestrial exoplanets: A case study of TRAPPIST-1 e."
[17] ROCKE-3D Group Meeting (virtual), Oct 27, 2025
[16] University of California, Riverside, May 9, 2025

"3-D Climate Modeling of Alien Worlds"
[15] University of California, Irvine, Feb 21, 2023
[14] Northwestern University, Evanston, IL, Dec 3, 2021
[13] University of California, Riverside (virtual), Mar, 9, 2021

"*A 3D Climate Modeler's Story: On the outer rim of exoplanetary science.*
[12] NASA Habitable Worlds Conference (virtual), Feb 25, 2021

"Exoplanet Modeling: Adventures in the Third Dimension."
[11] NASA Goddard Space Flight Center, Greenbelt, MD, Jun 7, 2019

"The Climate and Habitability of Terrestrial Extrasolar Planets Orbiting Low-Mass Stars."
[10] NASA GISS, New York, NY, July 11, 2017
[9] CASA/JILA Astrophysics Lunch Seminar, Boulder, CO, Apr 14, 2017

"Constraining the inner edge of the habitable zone: runaway and moist greenhouse atmospheres."
[8] Laboratory for Atmospheric and Space Physics, Boulder, CO, Sept 29, 2016
[7] Ball Aerospace, Boulder, CO, Nov 4, 2016

"Our Evolving Sun, Life on Earth, and the Habitability of Other Worlds."
[6] Laboratory for Atmospheric and Space Physics, Boulder, CO, Apr 6, 2016

"Fundamental problems concerning the evolution of planetary atmospheres."
[5] National Center for Atmospheric Research, Boulder CO, Nov 11, 2014

"Is the faint young Sun paradox solved?"
[4] Ball Aerospace, Boulder, CO, Nov 15, 2013
[3] Southwest Research Institute, Boulder, CO, Oct 22, 2013
[2] Laboratory for Atmospheric and Space Physics, Boulder, CO, Oct 3, 2013
[1] University of Michigan, Ann Arbor, MI, Sept 26, 2013

TEACHING AND MENTORING

Ph.D. Thesis Committees: Robbie Ridgeway, University of Exeter; Xuan Ji, University of Chicago; Parke Loyd, University of Colorado; Howard Chen, Northwestern University

Mentorship: Gabriella Suissa GSFC/UW; Alia Wofford, George Mason University; Vidya Venkatesan, University of California, Irvine; Huanzhou Yang, University of Chicago; Ed Stevenson, University of Cambridge; Edouard Barrier, University of Cambridge; Dylan Gatlin, University of Colorado

Teaching: ATOC 1070, University of Colorado; ASTR/GEOL 2040 University of Colorado