Jianhao Zhang, Ph.D.

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Professional Appointment

May 2023 – present	**Research Scientist II,** NOAA Chemical Sciences Laboratory & CIRES at the University of Colorado Boulder
Sept. 2021 – Apr. 2023	**Research Scientist I,** NOAA Chemical Sciences Laboratory & CIRES at the University of Colorado Boulder
Sept. 2020 – Aug. 2021	**NRC Postdoc fellowship** hosted by Graham Feingold at NOAA Chemical Sciences Laboratory

Education

2020 **Ph.D., University of Miami, Miami, FL, USA** in Meteorology & Physical Oceanography.
Dissertation title: *The interactions between light-absorbing smoke and marine boundary layer clouds over the remote southeast Atlantic.*
Committee: *Paquita Zuidema (Chair), Brian Mapes, Brian Soden, Cassandra Gaston, David Turner & Takanobu Yamaguchi*

2014 **B.S., Florida State University, Tallahassee, FL, USA** in Meteorology.
Magna cum laude; Minor in Mathematics.

Awards & Honors

- **Reflective Fellowship, 2025**, Reflective Inc.
- **National Research Council Research Associateship Fellowship, 2020**, National Academies of Sciences, Engineering, and Medicine
- **NASA's Group Achievement Awards** (ACTIVATE Team, 2023; ORACLES Team, 2019)
- **Finalist of University of Miami Best Ph.D. Dissertation, 2020**
- **University of Miami Graduate Fellowship, 2014** (highest award of the graduate school)

Grants

2025-2026	**P. I.:** A Framework for Assessing SRM Detectability for Informed Decision-Making (**Reflective**, $162,768)
2023-2026	**Co-I.:** Aerosol-Cloud Interactions Centered on MAGIC: Insights from Measurements and Lagrangian Large Eddy Simulation (**DOE** Atmospheric System Research, $670,445)
2023-2024	**Co-P.I.:** Exploring Aerosol-Cloud Interactions in Geophysical Variable Spaces using NASA-ACTIVATE Observations (**NASA** Earth Venture Suborbital-3, $350,000)
2020-2023	**Co-I.:** Evaluating Biases in Aerosol-Cloud Interaction Metrics using ARM Data and Models (**DOE** Atmospheric System Research, $510,472)
2020-2021	**P. I.:** National Research Council Fellowship Award (**National Academies of Sciences, Engineering, Medicine**, $62,000)
2020-ongoing	**NOAA Earth's Radiation Budget Program (internally funded):** **1.** Exploring the Susceptibility of Marine Stratocumulus Using Models, Reanalysis, and Satellite-Based Observations. **2.** Fundamentals of Aerosol-Cloud Interactions.

Publications

Peer-reviewed

1. **J. Zhang**, D. Painemal, T. Dror, J.-S. Lim, A. Sorooshian, and G. Feingold, "Inferring processes governing cloud transition during mid-latitude marine cold-air outbreaks from satellite," *EGUsphere*, vol. 2025, pp. 1–29, *under review*. DOI: 10.5194/egusphere-2025-5119.
2. G. Feingold, F. Glassmeier, **J. Zhang**, and F. Hoffmann, "Opinion: Inferring process from snapshots of cloud systems," *Atmospheric Chemistry and Physics*, vol. 25, no. 18, pp. 10 869–10 885, 2025. DOI: 10.5194/acp-25-10869-2025.
3. **J. Zhang**, Y.-S. Chen, E. Gryspeerdt, T. Yamaguchi, and G. Feingold, "Radiative forcing from the 2020 shipping fuel regulation is large but hard to detect," *Commun. Earth Environ.*, vol. 6, no. 18, pp. 1–11, 2025. DOI: 10.1038/s43247-024-01911-9.
4. Y.-S. Chen et al., "Diurnal evolution of non-precipitating marine stratocumuli in a large-eddy simulation ensemble," *Atmos. Chem. Phys.*, vol. 24, no. 22, pp. 12 661–12 685, 2024. DOI: 10.5194/acp-24-12661-2024.
5. G. Feingold et al., "Physical science research needed to evaluate the viability and risks of marine cloud brightening," *Science Advances*, vol. 10, no. 12, eadi8594, 2024. DOI: 10.1126/sciadv.adi8594.
6. **J. Zhang**, Y.-S. Chen, T. Yamaguchi, and G. Feingold, "Cloud water adjustments to aerosol perturbations are buffered by solar heating in non-precipitating marine stratocumuli," *Atmos. Chem. Phys.*, vol. 24, no. 18, pp. 10 425–10 440, 2024. DOI: 10.5194/acp-24-10425-2024.
7. C. Howes et al., "Biomass-burning smoke's properties and its interactions with marine stratocumulus clouds in WRF-CAM5 and southeastern Atlantic field campaigns," *Atmos. Chem. Phys.*, vol. 23, no. 21, pp. 13 911–13 940, 2023. DOI: 10.5194/acp-23-13911-2023.
8. **J. Zhang** and G. Feingold, "Distinct regional meteorological influences on low-cloud albedo susceptibility over global marine stratocumulus regions," *Atmos. Chem. Phys.*, vol. 23, no. 2, pp. 1073–1090, 2023. DOI: 10.5194/acp-23-1073-2023.
9. P. A. Barrett et al., "Intercomparison of airborne and surface-based measurements during the clarify, oracles and lasic field experiments," *Atmos. Meas. Tech.*, vol. 15, no. 21, pp. 6329–6371, 2022. DOI: 10.5194/amt-15-6329-2022.
10. M. S. Diamond et al., "Cloud adjustments from large-scale smoke–circulation interactions strongly modulate the southeastern atlantic stratocumulus-to-cumulus transition," *Atmos. Chem. Phys.*, vol. 22, no. 18, pp. 12 113–12 151, 2022, (ACP highlight). DOI: 10.5194/acp-22-12113-2022.
11. **J. Zhang**, X. Zhou, T. Goren, and G. Feingold, "Albedo susceptibility of northeastern pacific stratocumulus: The role of covarying meteorological conditions," *Atmos. Chem. Phys.*, vol. 22, no. 2, pp. 861–880, 2022. DOI: 10.5194/acp-22-861-2022.
12. **J. Zhang** and P. Zuidema, "Sunlight-absorbing aerosol amplifies the seasonal cycle in low-cloud fraction over the southeast atlantic," *Atmos. Chem. Phys.*, vol. 21, no. 14, pp. 11 179–11 199, 2021. DOI: 10.5194/acp-21-11179-2021.
13. X. Zhou, **J. Zhang**, and G. Feingold, "On the importance of sea surface temperature for aerosol-induced brightening of marine clouds and implications for cloud feedback in a future warmer climate," *Geophys. Res. Lett.*, vol. 48, no. 24, e2021GL095896, 2021. DOI: https://doi.org/10.1029/2021GL095896.
14. S. J. Abel et al., "Open cells exhibit weaker entrainment of free-tropospheric biomass burning aerosol into the south-east Atlantic boundary layer," *Atmos. Chem. Phys.*, vol. 20, no. 7, pp. 4059–4084, 2020. DOI: 10.5194/acp-20-4059-2020.

15 **J. Zhang** and P. Zuidema, "The diurnal cycle of the smoky marine boundary layer observed during August in the remote southeast Atlantic," *Atmos. Chem. Phys.*, vol. 19, no. 23, pp. 14 493–14 516, 2019, (ACP highlight). DOI: 10.5194/acp-19-14493-2019.

16 A. S. Chandra, P. Zuidema, S. Krueger, A. Kochanski, S. P. de Szoeke, and **J. Zhang**, "Moisture distributions in tropical cold pools from equatorial Indian ocean observations and cloud-resolving simulations," *J. Geophys. Res. Atmos.*, vol. 123, no. 20, pp. 11, 445–11, 465, 2018. DOI: 10.1029/2018JD028634.

17 **J. Zhang**, P. Zuidema, D. D. Turner, and M. P. Cadeddu, "Surface-based microwave humidity retrievals over the equatorial Indian ocean: Applications and challenges," *J. Appl. Meteor. Climatol.*, vol. 57, no. 8, pp. 1765–1782, 2018. DOI: 10.1175/JAMC-D-17-0301.1.

18 P. Zuidema et al., "The Ascension island boundary layer in the remote southeast Atlantic is often smoky," *Geophys. Res. Lett.*, vol. 45, no. 9, pp. 4456–4465, 2018. DOI: 10.1002/2017GL076926.

Other Publications

1 **J. Zhang** and G. Feingold, "Physical Science of Marine Cloud Brightening: Knowledge and Gaps," in *Topical Group on the Physics of Climate*, (invited article), American Physical Society, October 2024, pp. 1–4. URL: https://engage.aps.org/gpc/resources/newsletters.

2 G. Feingold et al., "DOE-NOAA Marine Cloud Brightening Workshop," in *U.S. Department of Energy and U.S. Department of Commerce NOAA*, DOE/SC-0207; NOAA Technical Report OAR ESRL/CSL-1, 2022, pp. 1–33.

Selected Oral Presentations (2022 -)

May 2025 — **AGU AS Early-Career Seminar, Online,** *Global climate and air quality implications of regional emission shift.* (invited)

Apr. 2025 — **Boulder Valley Rotary Club Weekly Meeting, Boulder, CO, USA,** *How to measure the shade of clouds that are no longer there.* (invited)

— **Climate Dynamics & Impacts, Vecchi/Soden Joint Group Meeting, Princeton University and University of Miami, Online,** *Large radiative forcing from the 2020 shipping fuel regulation is hard to detect: Implications for Marine Cloud Brightening.* (invited)

— **University of Washington Inaugural MCB Program Workshop, Leavenworth, WA, USA, Session co-lead and presenter,** *Identifying conditions amenable to cloud brightening/MCB* (invited)

— **NOAA Science Seminar Series, Online,** *AI Applications in Earth System and Climate Science: Aerosols and Air Quality.* (invited)

Dec. 2024 — **2024 AGU Fall Meeting, Washington D.C., USA,** *Large radiative forcing from the 2020 shipping fuel regulation is hard to detect.*

Nov. 2024 — **NOAA Advancing Innovative Research Seminar Series, Online,** *Large radiative forcing from the 2020 shipping fuel regulation is hard to detect.* (invited)

Oct. 2024 — **Micro2Macro Workshop by US CLIVAR, Laramie, WY, USA,** *Assessing the non-linear cloud susceptibility to N_d using Machine Learning: differences between GCMs and observation.*

Jun. 2024 — **TU Delft, Delft, Netherlands,** *On the viability of Marine Cloud Brightening: Albedo susceptibility, cloud adjustment, and detectability.* (invited)

May 2024 — **ACPC Workshop 2024, London & online, UK,** *Natural variability obscures the detectability of IMO2020's substantial perturbation to cloud radiative effect.*

Selected Oral Presentations (2022 -) (continued)

Nov. 2023 — **ACTIVATE Science Team Meeting 2023, Tucson, AZ, USA,** *Exploring emergent properties of complex aerosol-cloud-meteorology interactions over the WN Atlantic during ACTIVATE.*

NOAA Earth Radiation Budget Project Meeting, Boulder, CO, USA, *NOAA Marine Cloud Brightening Satellite Work.*

Oct. 2023 — **Brookhaven National Laboratory, Long Island, NY, USA,** *Aerosol-cloud interactions in marine warm clouds and implications for Marine Cloud Brightening.* (invited)

May 2023 — **ACPC Workshop 2023, Houston & online, TX, USA,** *Time-dependent cloud adjustments to aerosol in non-precipitating stratocumulus: diurnal cycle and MCB implications.*

Dec. 2022 — **2022 AGU Fall Meeting, Chicago, IL, USA,** *On the Conditionality of Marine Low Cloud Albedo Susceptibility: from Meteorological Conditions to Spatiotemporal Scales.* (invited)

Aug. 2022 — **AMS's 16th Conference on Cloud Physics, Madison, WI, USA,** *Distinct regional fingerprints of marine low cloud albedo susceptibility.*

May 2022 — **ACPC Workshop 2022, Online,** *Distinct regional meteorological influences on low cloud albedo susceptibility over global marine stratocumulus regions.*

Jan. 2022 — **2022 AMS Annual Meeting, New Orleans & online, LA, USA**
1. *Albedo susceptibility of marine stratocumulus: The role of covarying meteorological conditions & its geographical distribution.*
2. *Amplified seasonal cycle in southeastern Atlantic low cloud fraction when biomass burning smoke is present.*

Teaching, Mentoring & Outreach

Teaching — **Aerosol-Cloud-Climate Interactions** as *Guest lecturer*, TU Delft (June 2024)
Introduction to Weather and Climate as *Teaching Assistant*, University of Miami (2015)
AP calculus and undergrad statistics as *Math Tutor*, Miami (2015-2020)

Mentoring — **Tyler Tatro**, Ph.D. student at University of Miami (2022-present)
Alexander J. Thompson, Research Scientist at NOAA/PSL (2024-2025)
Danyan Leng, Ph.D. student at University of Colorado Boulder (2025-present)

Outreach — **CIRES Science Pathways Program**, CIRES speaker (2025-)
Scientist Panel, Environmental studies class at Boulder High School (2025)
Panelist, CIRES Graduate Student Workshop (2025)
Invited Scientist, Boulder Valley Rotary Club Weekly Discussion (2025)
Evaluator, Research Experience for Community College Students Symposium 2024; GLOBE International Virtual Science Symposium 2022; Climate Literacy and Energy Awareness Network 2022, AGU Outstanding Student Presentation Award 2020
Science vetting, Children's book *UP, UP HIGH*

Leadership & Service

Grant Reviewer — Department of Energy (DOE) Atmospheric System Research (ASR)
University of Colorado AB Nexus Program
NOAA Hollings Undergraduate Scholarship

Peer Reviewer — Atmospheric Chemistry and Physics (**EGU**); Communications Earth & Environment, npj Climate and Atmospheric Science (**Nature**), Science Advances (**AAAS**), Journal of Geophysical Research: Atmosphere, Journal of Geophysical Research: Machine Learning and Computation, Geophysical Research Letters (**AGU**); Journal of Climate, Bulletin of the American Meteorology Society, Journal of Applied Meteorology and Climatology (**AMS**); Climate Dynamics (**Springer**)

Leadership & Service (continued)

Committee	CIRES Members' Council (2025-present) CIRES Mentoring Program (2024-present, **Chair**) **NOAA OAR subject matter expert in *Satellite Data*** (2022-present) University of Miami RSMAS Student Seminar Committee (2016)
Convener/Lead	**Discussion Lead**, 2025 Radiation and Climate GRS, Lewiston, ME, USA **Session co-Lead**, University of Washington Inaugural MCB Workshop, 2025, Leavenworth, WA, USA **co-Convener**, *Advances in Cloud and Precipitation Processes: Integrating Observations, Modeling, and Theory* at the 2024 AGU Fall Meeting, Washington D.C., USA **co-Chair**, *Aerosol-Cloud Indirect Effects* at the AMS's 16^{th} Conference on Cloud Physics, Madison, WI, USA
Trainings	**Dialogic Skills Workshop Certificate**, University of Colorado Boulder, 2025 Micro2Macro Workshop by US CLIVAR (**rapporteur**), Laramie, WY, Oct. 2024 DOE-NOAA Marine Cloud Brightening Workshop (**rapporteur**), Online, Apr. 2022 EarthCare Workshop, Online, Feb. 2022 Aerosol and Clouds-Convection-Precipitation Workshop, Online, Oct. 2020 NCAR Radiation Workshop, Boulder, CO, Mar. 2016 First DOE ARM Summer School, Norman, OK, Jul. 2015
Field campaign	Swakopmund, Namibia, **ORACLES-2016**, Sept. 2016 São Tomé, São Tomé and Príncipe, **ORACLES-2017**, Aug. 2017
Misc.	Volunteer for CIRES Education & Outreach FSU Intramural Basketball Official (2014)

Media & Press

- *Ensuring continuity for atmospheric research*, [Link], **Reflective blog post**, 2025
- *Flying high in the sky*, [Link], **CIRES Spotlights**, 2025
- *The unintended consequences of reducing sulfur emissions from ships*, [Link], **NOAA CPO News**, 2025
- *Scientists turn to artificial intelligence to assess the warming effect of reduced pollution*, [Link], **NOAA Research**, 2025
- *Scientists turn to artificial intelligence to assess the warming effect of reduced pollution*, [Link], **CIRES News**, 2025
- *Cleaner Ships, Hotter Earth: The Unexpected Climate Twist*, [Link], **SciTechDaily**, 2025
- *Shipping emissions reduction sheds light on marine cloud geoengineering*, [Link], **Mongabay**, 2024
- *Smoke Studies: Crucial Cloud-Deck Science*, [Link], **DOE ARM NEWS**, 2021

References

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