Clare Singer **August 2023**
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https://claresinger.github.io/

Research Interests

- Cloud feedbacks, boundary layer cloud dynamics, cloud-aerosol interactions, cloud-circulation coupling

Education

- **California Institute of Technology** Pasadena, CA
  Department of Environmental Science and Engineering *October 2018 - August 2023*
  - M.S. June 2020; Ph.D. August 2023
  - Research advisor: Dr. Tapio Schneider
  - Thesis: "The role of small-scale cloud, aerosol, and radiation processes for Earth's climate"
- **University of Chicago** Chicago, IL
  BA Physics, BS Mathematics *September 2014 - June 2018*
  - Research Advisor: Dr. Liz Moyer
  - Undergraduate honors thesis: "Comparison of water vapor observations in the Asian Monsoon UTLS region"

Academic Appointments

- **NOAA C&GC Postdoctoral Fellow** Palisades, NY
  Columbia University, Lamont-Doherty Earth Observatory *October 2023 - Present*
  - Hosts: Robert Pincus (Lamont), Yi Ming (Boston College)
- **Graduate research assistant** Pasadena, CA
  California Institute of Technology *October 2018 - August 2023*
  - Research Advisor: Dr. Tapio Schneider

Publications

1. **C.E. Singer** and T. Schneider. "Stratocumulus-cumulus transition explained by bulk boundary layer theory." *Journal of Climate*, In revision.
2. **C.E. Singer** and T. Schneider. "An analytical perspective on stratocumulus cloud response to CO_2 forcing." *Journal of Climate*, In revision.
3. E.K. de Jong, **C.E. Singer**, et al. "PySDM v2: collisional breakup, immersion freezing, dry aerosol initialization, and adaptive time-stepping." *Journal of Open Source Software*, 8(84), 4968, 2023.
4. K.A. Schiro, et al., "Model spread in tropical low cloud feedback tied to overturning circulation response to warming." *Nature Communications*, 13, 7119, 2022.
5. DOE-NOAA Marine Cloud Brightening Workshop Report. Feingold G., V. P. Ghate, L. M. Russell, et al., U.S. Department of Energy and U.S. Department of Commerce NOAA; DOE/SC-0207; NOAA Technical Report OAR ESRL/CSL-1. 2022.
6. P. Bartman, et al., "PySDM v1: particle-based cloud modeling package for warm-rain microphysics and aqueous chemistry." *Journal of Open Source Software*, 7(72), 3219, 2022.
7. **C.E. Singer**, B. Clouser, E.J. Moyer, et al., "Intercomparison of UTLS water vapor measurements over the Asian Summer Monsoon." *Atmospheric Measurement Techniques*, 15, 4767-4783, 2022.
8. S. Khaykin, et al., "Persistence of moist plumes from overshooting convection in the Asian monsoon anticyclone." *Atmospheric Chemistry and Physics*, 22, 3169-3189, 2022.

9. **C.E. Singer**, I. Lopez-Gomez, X. Zhang, T. Schneider, "Top-of-atmosphere albedo bias from neglecting three-dimensional cloud radiative effects." *Journal of Atmospheric Science*, 78(12), 4053-4069, 2021.

10. Y. Ming, et al., "Assessing the influence of COVID19 on the shortwave radiative fluxes over the East Asian Marginal Seas." *Geophysical Research Letters*, e2020GL091699, 2020.

11. R. Bernstein, **C.E. Singer**, et al., "UV initiated surface grafting on polyethersulfone ultrafiltration membranes via ink-jet printing assisted modification." *Journal of Membrane Science*, 548, 2018.

12. K.A. Murphy, et al., "Freestanding loadbearing structures with Z-shaped particles." *Granular Matter*, 18 (26), 2016.

In preparation:

a) **C.E. Singer** and A. Jaruga. "Sensitivity of stratocumulus clouds to aerosol hygroscopicity." *Atmospheric Chemistry and Physics*, In Prep.

b) *M. Liu-Schiaffini, **C.E. Singer**, et al. "Tipping Point Forecasting in Non-Stationary Dynamics on Function Spaces." In prep.

c) B. Clouser, **C.E. Singer**, E.J. Moyer, et al. "Isotopic composition of water vapor in the Asian Summer Monsoon." *Atmospheric Chemistry and Physics*, In Prep.

d) B. Clouser, **C.E. Singer**, E.J. Moyer, et al. "ChiWIS: The Chicago Water Isotope Spectrometer." *Atmospheric Measurement Techniques*, In Prep.

(* = student advisee)

Invited Presentations

1. FSU Meteorology Seminar. "" Dec 2023.

2. UIUC Department of Atmospheric Sciences Seminar. "" Nov 2023.

3. Gordon Research Seminar: Radiation and Climate. "Exploring CO2-Induced Stratocumulus Cloud Breakup in CESM." Jul 2023.

4. JPL Center for Climate Sciences (CCS) Friday Seminar Series. "How clouds shape our climate." Apr 2023.

5. UCSD Scripps Institute of Oceanography, Climate Journal Club. "How clouds shape our climate." Mar 2023.

6. GFDL AOS Seminar. "Stratocumulus-cumulus transitions." Feb 2023.

7. NASA GISS Lunch Seminar. "How clouds shape our climate." Feb 2023.

Awards

NOAA Climate & Global Change Postdoctoral Fellowship 2023-2025
3rd place, DRI's Wagner Award for Women in Atmospheric Sciences (paper competition) 2023
CalGFD Student Presentation Award 2022
CFMIP Outstanding Early Career Presentation Award 2022
Caltech ESE Department (inaugural) Service Award 2021
Richard H. Jahns Teaching Award (Caltech GPS Division TA Award) 2021
NSF Graduate Research Fellowship 2018-2021
Barry M. Goldwater Scholarship 2017
Astronaut Scholarship 2017
John Haeseler Lewis Prize (UChicago top graduating physics major) 2018
David W. Grainger Fellowship (UChicago top rising senior in physics) 2017

Conference Presentations

1. "Exploring CO2-Induced Stratocumulus Cloud Breakup in CESM." **Oral & Poster.** Gordon Research Seminar & Conference; Lewiston, ME; July 2023.

2. "Surface-Active Organics: Results from a Particle-Based Microphysics Model Calibrated with Laboratory Experiments." **Oral.** AMS annual meeting; Denver, CO; January 2023.
3. "Stratocumulus cloud feedbacks in a simple physical model." **Oral.** CalGFD; Pasadena, CA; August 2022.
4. "Extended mixed-layer theory for the stratocumulus-cumulus transition in climatology and under extreme CO_2 forcing." **Oral.** CFMIP; Seattle, WA; July 2022.
5. "Successes, Challenges, and Lessons Learned by the Caltech URGE Pod." **Poster.** AGU 2021 Fall Meeting; New Orleans, LA; December 2021.
6. "Analytical Theory for Stratocumulus Cloud Feedbacks." **Oral.** AGU 2021 Fall Meeting; New Orleans, LA; December 2021.
7. "Quantifying Cloud Sensitivity to Aerosol Hygroscopicity using a Lagrangian Cloud Model." **Virtual oral.** ICCP; August 2021.
8. "Top-of-atmosphere albedo bias from neglecting three-dimensional radiative transfer through clouds." **Virtual poster.** AGU 2020 Fall Meeting; December 2020.
9. "Investigating Stratocumulus Cloud Sensitivity to Aerosol Hygroscopicity using a Lagrangian Particle-based Microphysics Model." **Poster.** AGU 2019 Fall Meeting; San Francisco, CA; December 2019.
10. "A Conceptual Model of the Climate Change Response in Stratocumulus-Topped Boundary Layers." **Poster.** AMS Conference on Atmospheric and Oceanic Fluid Dynamics; Portland, ME; June 2019.
11. "ChiWIS: The Chicago Water Isotope Spectrometer." **Poster** Goldschmidt; Boston, MA; Aug 2018.
12. "Comparison of water vapor from observations and models in the Asian Monsoon UTLS region." **Poster.** AGU 2017 Fall Meeting; New Orleans, LA; Dec 2017.

Teaching and Mentoring

- **Teaching Assistant** — Caltech
  ESE 101 (Fall 2019), ESE 130 (Winter 2021), ESE 134 (Spring 2022) — *2019-2022*
  - ESE 101 (Earth's Atmosphere): I developed weekly quizzes, hosted office hours, and graded homework assignments.
  - ESE 130 (Atmosphere and Ocean Dynamics, an introductory GFD course): I hosted office hours, graded homework assignments, and created short videos for asynchronous learning.
  - ESE 134 (Cloud and Boundary Layer Dynamics): I wrote and graded homework assignments, hosted weekly office hours, prepared two 90-minute lectures on stratocumulus-topped boundary layers and cloud microphysics, and graded student final presentations and written reports.
- **SURF mentor** — Caltech
  Summer Undergraduate Research Fellow program — *Summer 2022*
  - I mentored a Caltech undergrad student in her first research experience through the SURF program.
  - **Scientific goals:** characterize subtropical humidity in present climate, how it changes under future emissions scenarios, and quantify the spread across the CMIP6 model ensemble.
  - **Technical goals:** develop coding skills, learn how to work with large amounts of data on remote machines, gain familiarity with climate science concepts.

DEI Activities

- **Caltech GPS URGE Pod** — Caltech
  Member (2020-2022) and Leader (2022) — *2020 - 2023*
  - Participant and leader of the Caltech GPS's Unlearning Racism in the Geoscience Pod. This group participated in the national curriculum for URGE in Jan-June 2020 reading primary literature on structural racism in the geosciences and developing action plans for our own department. From June 2020 until present our Pod has been enacting these plans – working with our division's DEI committee, Academic Committee, Fieldwork Committee, and the Chair.

- **Women in GPS student group** Caltech
  President (2021-2022); Vice President (2019-2021) *2018 - 2023*
  - Managed and oversaw club activities – including journal club discussions, workshops, and social events – communicates with faculty, and recruiting new members.
- **Title IX Student Leadership Team** Caltech
  Giving Voice script writer (2019-2020); Title IX Council member (2019-2022) *2019 - 2022*
  - Provided resources and created awareness around Title IX topics for students, staff, and faculty.

Professional Service

- **Journal reviewer** for *Nature, GRL, JAS, JAMES, JGR: Atmospheres, ACP*
- **Organizer** of Lamont OCP Seminar (2023-2024)
- **Organizer** of Caltech ESE Department Seminar (2019-2022)