Francisco Spaulding-Astudillo, Ph.D.

fspauldinga@ucla.edu • 815-621-6825 • fspauldinga.com • linkedin.com/in/fesa • Los Angeles, CA

Research professional with over 7 years of STEM experience, adept at independent and collaborative problem-solving. Skilled in utilizing and rapidly learning state-of-the-art tools and programming languages, and proficient in communicating scientific knowledge and delivering results to stakeholders.

EDUCATION

University of California, Los Angeles

Ph.D. in Geophysics and Space Physics — *2023*
M.S. in Geophysics and Space Physics — *2021*

University of Chicago

B.S. in Geophysical Sciences — *2017*

PROFESSIONAL EXPERIENCE

UCLA Department of Earth, Planetary, and Space Sciences
Post-Doctoral Fellow — *2023-present*

- Investigate natural hazards associated with tropical clouds and convective storms using state-of-the-art modeling tools and public datasets such as ERA5 and HURDAT2
- Lead climate model software development in Fortran in support of current research objectives
- Collaborate with national and international colleagues on ongoing research

UCLA Department of Earth, Planetary, and Space Sciences
Ph.D. Researcher — *2018-2023*

Project 1: Predicting cloud height with infrared spectroscopy simulations

- Utilized Python to run a state-of-the-art radiation model and statistically analyze CSV data using standard libraries (pandas, numpy, matplotlib)
- Developed a robust cloud prediction method by solving fluid dynamics and radiative transfer partial-differential equations, resulting in 1 journal publication and 1 conference presentation

Project 2: Identifying statistical properties of severe convective storms in a model ensemble

- Identified over 100 extreme precipitation events in time-series netCDF data, demonstrating a 30 year trend towards increasingly episodic storm activity at higher sea surface temperatures.
- Expanded CMIP6 climate model capabilities by updating, compiling, and deploying Fortran source code on a Linux computing environment, resulting in 1 journal publication

Project 3: Assessing the climate impact of high water vapor concentrations

- Simulated the effect of changing water vapor concentrations in a general circulation model
- Designed the study, ran the experiments, analyzed 10 TB of geospatial data in Python, published results in 1 journal and presented at 3 conferences

University of Chicago Department of the Geophysical Sciences
Scientific software developer — *2017-2018*

- Developed a MATLAB algorithm to solve an ice sheet flow problem, resulting in 2 conference presentations and 1 follow-up study
- Implemented and solved the algorithm on a C-type Arakawa spherical grid using Adams-Bashforth time stepping and center difference approximation

PUBLICATIONS

Spaulding-Astudillo, F. E., Habib, N., Fan, B., Dagan, G. & Mitchell, J. L. (2024d). "Core mechanisms of episodic precipitation in convection-resolving simulations", in preparation.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2024c). "Near-surface drivers of low cloud dispersal and their climate impact in radiative-convective equilibrium", in preparation.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2024b). "Clear-sky convergence and the origin of tropical congestus clouds". *AGU Advances*, in review.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2024a). "A simple model for the emergence of relaxation-oscillator convection". *Journal of Advances in Modeling Earth Systems*, in review.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2023). "Effects of saturation vapor pressure on clouds, climate, and convection". *Journal of the Atmospheric Sciences*, *80*(5), 1247-1266. https://doi.org/10.1175/JAS-D-22-0063.1

Abbot, D. S., Bloch-Johnson, J., Checlair, J., Farahat, N. X., Graham, R. J., Plotkin, D., Popovic, P., & **Spaulding-Astudillo, F. E.** (2018). Decrease in Hysteresis of Planetary Climate for Planets with Long Solar Days. *The Astrophysical Journal*, *854*(1), 3. https://doi.org/10.3847/1538-4357/aaa70f

INVITED PRESENTATIONS

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2024, June 24-28). *The origin of tropical congestus clouds: a clear-sky convergence perspective*. AMS 24th Conference on Atmospheric and Oceanic Fluid Dynamics, Burlington, VT, U.S.A.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2023, Dec. 11-15). *The physical origin of tropical congestus clouds*. AGU 2023 Fall Meeting, San Francisco, CA, U.S.A.

Mitchell, J. L. & **Spaulding-Astudillo, F. E.** (2023, Dec. 11-15). *A proposal for the origin of oscillating convection in planetary atmospheres*. AGU 2023 Fall Meeting, San Francisco, CA, U.S.A.

Li, L., Li, C., Chen. S., Fan, B**., Spaulding-Astudillo, F. E.**, & Habib, N. (2023, Dec 11-15). *Atmospheric circulation of highly irradiated terrestrial planets*. AGU 2023 Fall Meeting, San Francisco, CA, U.S.A.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2022, Dec. 12-16). *Energy and moisture budgets of simulated 1D moist greenhouse climates with and without a time-dependent forcing*. AGU 2022 Fall Meeting, Chicago, IL, U.S.A.

Fan, B., Habib, N., **Spaulding-Astudillo, F. E.**, Kite, E. S., Li, C. *Gone with the rock wind: A boundary layer model of close-in, rocky exoplanets with condensable-rich atmospheres*. AGU 2022 Fall Meeting, Chicago, IL, U.S.A.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2021, Dec 13-17). *Emergence of 3 cloudy climate states in 1D-RCE experiments varying the column water vapor*. AGU 2021 Fall Meeting, New Orleans, LA, U.S.A.

Spaulding-Astudillo, F. E. & Mitchell, J. L. (2020, Dec 13-17). *Response of cloud formation and cloud radiative effects to volatility of water vapor in terrestrial planetary atmospheres*. AGU 2020 Fall Meeting, virtual.

Abbot, D. S., Checlair, J., Alcabes, O., Finkel, J., Graham, R., Komacek, T., Olson, S., Popovic, P., Salazar, A., **Spaulding-Astudillo, F.E.**, Webber, R. (2018, Dec 10-14). *The effect of ocean dynamics on the transition of tidally locked planets to global glaciation*. AGU 2018 Fall Meeting, D.C., U.S.A.

Spaulding-Astudillo, F. E., Tziperman, E., & Abbot, D. S. (2018, Dec 10-14). *Investigating equatorial gaps in snowball Earth sea glaciers on tidally-locked exoplanets around M-stars*. AGU 2018 Fall Meeting, D.C., U.S.A.

SKILLS

Programming: Python, Fortran, MATLAB, Linux, Bash, high-performance scalable parallel computing

Climate models: System for Atmospheric Modeling (SAM), LMD Planetary Climate Model (PCM), Max-Planck Institute General Circulation Model (ECHAM6), European Centre for Medium-Range Weather Forecasts Reanalysis v5 (ERA5), NASA Modern-Era Retrospective Analysis for Research and Applications v2 (MERRA-2), Coupled Model Intercomparison Project Phase 6 (CMIP6)