Dr. Francisco Spaulding-Astudillo

Postdoctoral Scholar

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(815)-621-6825
LinkedIn Website Github

Education

Doctor of Philosophy (Ph.D.)
Geophysics and Space Physics
UCLA
2021-2023
Los Angeles, CA

Master of Science (M.S.)
Geophysics and Space Physics
UCLA
2018-2021
Los Angeles, CA

Bachelor of Science (B.S.)
Geophysical Sciences
University of Chicago
2013-2017
Chicago, IL

Skills

- Data analysis and visualization (Python, MATLAB, Fortran, CDO)
- Advanced mathematics (linear algebra, calculus, ODEs/PDEs)
- Computational fluid dynamics (Navier-Stokes, finite difference, gradient descent, verification, validation, incompressible flow)
- Applied physics (thermodynamics, spectroscopy, orbital mechanics)
- Numerical climate modeling (CMIP6, ERA5, MERRA-2)
- Numerical radiative transfer (RFM)
- Written and verbal communication (4 papers written; 3 oral and 10 conference presentations)
- Mentoring and advising (at masters and undergraduate level)

Work Experience

Postdoctoral Scholar
University of California, Los Angeles
2024 – Current Los Angeles, CA

Research:

- Boundary-driven intensification of mature hurricanes in a warmer climate
- Dynamics of tropical congestus clouds in convection-resolving simulations
- Impact of warming on the frequency and intensity of surface precipitation

Advising:

- Co-advisor to 2 master's students in UCLA's AOS Department

Graduate Student Researcher
University of California, Los Angeles
2018 – 2023 Los Angeles, CA

Project 1:* Applied spectroscopy to extract cloud height information (in review: *Nature Geoscience)

- Discovered that water absorption lines control the formation height of tropical congestus clouds using high-resolution infrared spectroscopy
- Designed and ran radiation experiments with state-of-the-art Reference Forward Model, resulting in 1 journal publication and 1 oral presentation at the 2023 AGU Fall Meeting
- Developed a Python algorithm to extract key features from high-resolution spectral data and combine them into a useful metric for cloud prediction on large spatial scales

Project 2:* Improved prediction of severe, episodic convective storms using quasi-equilibrium thermodynamics (in review: *PSJ)

- Identified statistical imbalances between heat transport and potential energy as key factors in episodic storm activity in some climate models
- Updated and ran CMIP6 model using Fortran, Linux, and Bash; and analyzed 2 TB geospatial data in Python, resulting in 1 publication and 1 oral presentation
- Built a Python code to identify extreme precipitation events in time series data and used them to validate a novel predictive model based on statistical mechanics

***Project 3:* Response of the climate system to varying water concentration (Spaulding-Astudillo and Mitchell 2023)**

- Carried out the first sensitivity study of a CMIP6 model to water saturation vapor pressure to quantify the potential effects of climate change
- Designed the study, ran the experiments, analyzed 10 TB geospatial data in Python, published in 1 journal, and presented the results at 3 conferences

Graduate Teaching Assistant
University of California, Los Angeles
2019 – 2023 Los Angeles, CA

***EPSS Courses:* Solar System & Planets; Intro to Oceanography**

- Instructed, supported, and created formative assessments for 100 students in undergraduate STEM courses, emphasizing front-of-class, student-led derivations

Science Communication

American Geophysical Union Fall Meeting
December 2023 San Francisco, CA

- Invited oral: *The physical origin of tropical congestus clouds* in "Atmospheric Convection: Processes, Dynamics, and Links to Weather and Climate" session
- Invited oral: *A proposal for the origin of oscillating convection in planetary atmospheres* in "Atmospheres, Climate, and Potential Habitability of Rocky Exoplanets" session