Zachary Espinosa

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EDUCATION

University of Washington, Seattle, WA   Expected Jun 2025
PhD, Atmospheric and Climate Science | Advanced Data Science Option

Stanford University, Stanford, CA   Jun 2021
M.S. Applied and Engineering Physics, Schools of Arts and Science

Stanford University, Stanford, CA   Sep 2020
B.S. Computer Science, School of Engineering | Concentration: Artificial Intelligence

HONORS & FELLOWSHIPS

Department of Energy Computational Science Graduate Fellowship (DOE CSGF)   Apr 2022

Graduate Student Equity & Excellence Fellowship (GSEE Fellow)   Sep 2021

Achievement Rewards for College Scientists Foundation Scholar (ARCS Scholar)   Sep 2021

The GEM National Consortium Graduate Fellow (GEM Graduate Fellow)   Jan 2020

Peer-Reviewed Publications & Submitted Manuscripts

[6] **Espinosa, Zachary I.,** Edward Blanchard-Wrigglesworth, and Cecilia Bitz. "Record Low Antarctic Sea Ice in Austral Winter 2023: Mechanisms and Predictability." *Authorea Preprints* (2024)." **10.22541/essoar.171466440.03718233/v1**

[5] Schneider, D. P., Yin, Z., O'Connor, G. K., Blanchard-Wrigglesworth, E., Cast, Z. I., Datta, R., & **Espinosa, Zachary I.** (2024). Increasing Antarctic snowfall mitigates sea level rise less than projected due to meltwater influence on sea surface temperatures. *Authorea Preprints*. **10.22541/essoar.172411232.25724214/v1**

[4] Cresswell-Clay, N., Liu, B., Durran, D., Liu, A., **Espinosa, Zachary I.,** Moreno, R., & Karlbauer, M. (2024). A Deep Learning Earth System Model for Stable and Efficient Simulation of the Current Climate. *arXiv preprint arXiv:2409.16247*.**https://doi.org/10.48550/arXiv.2409.16247**

[3] **Espinosa, Zachary I**., and Mark D. Zelinka. "The shortwave cloud-SST feedback amplifies multi-decadal Pacific sea surface temperature trends: Implications for observed cooling." *Geophysical Research Letters* 51.18 (2024): e2024GL111039. **https://doi.org/10.1029/2024GL111039**

[2] Blanchard-Wrigglesworth, E., Cox, T., **Espinosa, Zachary I.,** & Donohoe, A. (2023). The largest ever recorded heatwave—Characteristics and attribution of the Antarctic heatwave of March 2022. *Geophysical Research Letters*, *50*(17), e2023GL104910. **https://doi.org/10.1029/2023GL104910**

[1] **Espinosa, Zachary I**., et al. "Machine learning gravity wave parameterization generalizes to capture the QBO and response to increased CO2." *Geophysical Research Letters* 49.8 (2022): e2022GL098174. **https://doi.org/10.1029/2022GL098174**

PROFESSIONAL EXPERIENCE

PhD Intern | *Livermore, CA* | **Lawrence Livermore National Laboratory**   June 2023 – Sep 2023
• Studied the impact of marine boundary layer clouds on historical East Pacific Ocean cooling

PhD Intern | *Richland, WA* | **Pacific Northwest National Laboratory**   June 2021 – Sep 2021
• Studied the impact of climate change on annual precipitation in the Amazon Rainforest

Graduate Research Assistant | *Stanford, CA* | **Stanford Earth Systems Science**   Sep 2019 – Sep 2021
• Developed a machine learning parameterization of gravity wave in a global climate model (Sheshadri Group)
• Publication in Geophysical Research Letters - Espinosa, Zachary I., et al (2022)

Machine Learning Engineering Intern | *Redwood City, CA* | **UnifyID**   Apr 2020 – Jun 2020
• Developed in-house machine learning pipeline for research & development. Introduced pipeline testing

Quantum Engineering Intern | *Palo Alto, CA* | **AT&T Foundry**   Jun 2019 – Sep 2019
• Built an open-source python framework for quantum networking (QN) simulations called netQuil, designed to support the implementation of canonical QN protocol (e.g. teleportation, superdense coding)

Software Engineering Intern | *Mountain View, CA* **| Smartcar, Inc.**   Jan 2019 – Jun 2019

- Designed, built, and launched electric vehicle endpoints for Smartcar API
- Maintained python, node.js, and java SDKs. Contributed to OAuth2 pipeline.

Mobile Software Engineering Intern | *San Francisco, CA* | **OXO, Inc.**   Apr 2018 – Sep 2018

- Built first iteration MVP mobile app for iOS and Android using React Native, Firebase, Heroku, and AWS RDS.

Web and Networking Engineering Intern | *Ashton, ID* | **Henry's Fork Foundation**   Jun 2017 – Sep 2017

- Designed and built a [data collection network](#) for monitoring the Yellowstone watershed.

TEACHING, MENTORSHIP & SERVICE

Instructor & Mentor	AI Fellowship Program	*VeritasAI*	Jun 2024 – Present
Graduate Student Representative	UW Program on Climate Change	*Seattle, WA*	Sep 2022 – Sep 2024
Graduate President of UW American Meteorological Society Chapter	*Seattle, WA*	Sep 2021 – Sep 2023
Guest Lecturer	ATMS 220: Exploring the Atmospheric Sciences	*Seattle, WA*	Oct 2023
Guest Lecturer	ATMS 220: Exploring the Atmospheric Sciences	*Seattle, WA*	May 2023
Teaching Assistant	ATMS 101: Weather	*Seattle, WA*	Jan 2023 – Mar 2023

PRESENTATIONS

Poster	**CFMIP 2024**	The Impact of the Shortwave Cloud Feedback on East Pacific Multi-Decadal Variability	Jun 2024
Talk	**UW Climate Dynamics Seminar**	From Record Low Sea Ice to East Pacific Cooling: Unraveling SH Extremes	Apr 2024
Poster	**US CLIVAR Blocking and Extreme Weather Workshop**	The Physics of Antarctic Heatwaves	Mar 2024
Poster	**AGU Fall Meeting**	The Physics of Antarctic Heatwaves	Dec 2023
Poster	**Graduate Climate conference**	Drivers of Record Low Antarctic Sea Ice in Austral Winter 2023	Oct 2023
Poster	**DOE CSGF Annual Review**	The Physics of Antarctic Heatwaves	Jul 2023
Talk	**Scientific Committee on Antarctic Research**	The Physics of Summertime Antarctic Heatwaves	June 2023
Poster	**BEPSII Arctic Field School**	Drivers of Interannual Variability of Summer Sea Ice Extent	May 2022
Talk	**AGU Fall Meeting**	Machine Learning Emulation of Parameterized Gravity Wave Momentum	Dec 2021
Talk	**EGU General Assembly**	Machine Learning Emulation of Parameterized Gravity Wave Momentum	Apr 2021
Talk **| CalGFD |** A Data-Drive, Single column Gravity Wave Parameterization in an Idealized Model	Aug 2020
Poster **| Stanford Deep Learning Poster Session |** Distracted Driver Detection	Jun 2018
Poster **| Stanford Artificial Intelligence Post Session |** Tracking Schistosomiasis with Computer Vision	Mar 2018

ADDITIONAL INFORMATION

Tooling: Python, Tensorflow, Dask, Fortran, C, C++, Julia, Node.js, Express, Javascript, React Native, AWS, Postgres, SQL

Expertise: Climate modeling, Extreme Weather**,** Data Analytics**,** Deep Learning, Reinforcement Learning, Computer Vision