

Sam Silva, Ph.D.

Assistant Professor

University of Southern California

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PROFESSIONAL APPOINTMENTS

Assistant Professor Jan 2022-Present

Department of Earth Sciences

Department of Civil and Environmental Engineering

Department of Population and Public Health Sciences

University of Southern California, Los Angeles, CA

Research Scientist 2021

Pacific Northwest National Laboratory, Richland, WA

Linus Pauling Distinguished Postdoctoral Fellow 2019-2021

Pacific Northwest National Laboratory, Richland, WA

EDUCATION

Ph.D. Environmental Engineering and Computation

Massachusetts Institute of Technology, Cambridge, MA

2019

M.S. Atmospheric Sciences

University of Arizona, Tucson, AZ

2014

B.S. Physics

University of Arizona, Tucson, AZ

2013

PUBLICATIONS

Group members/mentees are listed in **bold**.

Submitted and Under Review

Ziming, L., **Sturm, P. O.**, Bharadwaj, S., **Silva, S. J.**, and Tegmark, M. (Submitted)
Discovering New Interpretable Conservation Laws as Sparse Invariants.

Azzouz, M, Hasan, Z, Rahman, Md. M., Gauderman, W. J., Lorenzo, M, Lurmann, F. W.,
Eckel, S. P., Palinkas, L., Johnston, J., Hurlburt, M., **Silva, S. J.**, **Schlaerth, H.**, Ko, J, Ban-
Weiss, G, McConnell, R, Stockfelt, L, Garcia, E. (Submitted) Does socioeconomic and
environmental burden affect vulnerability to extreme air pollution and heat? - A
case-crossover study of mortality in California

Silva, S. J., and Keller, C. A. (Submitted) Spurious explanations: limitations of XAI
methods for process-level understanding in the atmospheric sciences

Schlaerth, H. L., **Silva, S. J.**, Li, Y. (Under Review) Characterizing ozone sensitivity to
urban greening in Los Angeles under current day and future anthropogenic
emissions scenarios

Clifton, O. E., Schwede, D., Hogrefe, C., Bash, J. O., Bland, S., Cheung, P., Coyle, M.,
Emberson, L., Flemming, J., Fredj, E., Galmarini, S., Ganzeveld, L., Gazetas, O., Goded,

I., Holmes, C., D., Horváth, L., Huijnen, V., Li, Q., Makar, P. A., Mammarella, I., Manca, G., Munger, J. W., Pérez-Camanyo, J. L., Pleim, J., Ran, L., San Jose, R., **Silva, S. J.**, Staebler, R., Sun, S., Tai, A. P. K., Tas, E., Vesala, T., Weidinger, T., Wu, Z., and Zhang, L. (Under Review) A single-point modeling approach for the intercomparison and evaluation of ozone dry deposition across chemical transport models (Activity 2 of AQMEII4)

Yu, S., Pritchard, M., Ma, P.-L., Singh, B., **Silva, S. J.** (Under Review) Two-step hyperparameter optimization method: Accelerating hyperparameter search by using a fraction of a training dataset

Lyman, K., Krishnamoorthy, B., **Silva, S. J.**, Halappanavar, M., Kalyanaraman, A., Keller, C., and Barber, V. (Submitted) Persistent Cycles in Dynamic Directed Bipartite Graphs: An Application in Atmospheric Chemistry

Schlaerth, H. L., Silva, S. J., Li, Y., Li, D. (Under Review) Albedo as a competing warming effect of urban greening

John, S. G., Pasquier, B., Holzer, M., **Silva, S. J.**, (Under review) Biogeochemical fluxes of nickel in the global oceans inferred from a diagnostic model

Peplinski, M., Dilkina, B., **Silva, S. J.**, Ban-Weiss, G., Sanders, K. T. (Under Review). A machine learning framework to estimate residential electricity demand based on smart meter electricity, climate, building characteristics, and socioeconomic datasets

Peer-Reviewed

23. **Yik, W., Silva, S. J.**, Geiss, A., Watson-Parris, D. (Accepted, 2023) Exploring Randomly Wired Neural Networks for Climate Model Emulation *AIES*
22. Palinkas, L. A., De Leon, J., Yu, K., Salinas, E., Fernandez, C., Johnston, J., Rahman, M., Md., **Silva, S. J.**, Hurlburt, M., McConnell, R. S., Garcia, E. (2023). Adaptation resources and responses to wildfire smoke and other forms of air pollution in low-income urban settings: A mixed-methods study, *IJERP* 20, no. 7 (April 4, 2023): 5393. <https://doi.org/10.3390/ijerph20075393>.
21. **Silva, S. J.**, Burrows, S. M., Calvin, K., Cameron-Smith, P. J., Shi, X., Zhou, T. (2023). Contrasting the biophysical and radiative effects of rising CO₂ concentrations on ozone dry deposition fluxes, *JGR: Atmospheres*, 128, no. 6 (March 27, 2023): e2022JD037668. <https://doi.org/10.1029/2022JD037668>.
20. Rahman, Md Mostafijur, Lorenzo, M, Ban-Weiss, G, Hasan, Z, Azzouz, M, Eckel, S. P., Conti, D. V., Lurmann, F. W., **Schlaerth, H.**, Johnston, J, Ko, J, Palinkas, L, Hurlburt, M, **Silva, S. J.**, W Gauderman, W. J., McConnell, R, and Garcia, E., (2023) Ambient temperature and air pollution associations with suicide and homicide mortality in California: A Statewide Case-Crossover Study, *STOTEN*, 874 (May 2023): 162462. <https://doi.org/10.1016/j.scitotenv.2023.162462>
19. Palinkas, L. A., Hurlburt, M. S., Fernandez, C., De Leon, J., Yu, K., Salinas, E., Garcia, E., Johnston, J., Rahman, M. M., **Silva, S. J.**, McConnell, R. S. (2022). Vulnerable, Resilient, or Both? A Qualitative Study of Adaptation Resources and Behaviors to Heat Waves

- and Health Outcomes of Low-Income Residents of Urban Heat Islands *IJERPH*, <https://doi.org/10.3390/ijerph191711090>
18. Geiss, A., **Silva, S. J.**, and Hardin, J. (2022) Downscaling Atmospheric Chemistry Simulations with Physically Consistent Deep Learning, *Geosci. Model Dev.*, March 23, 2022. <https://doi.org/10.5194/gmd-2022-76>.
 17. Rahman, Md Mostafijur, McConnell, R., **Schlaerth, H.**, Ko, J., **Silva, S. J.**, Lurmann, F. W., Palinkas, L., Johnston, J., Hurlburt, M., Yin, H., Ban-Weiss, G and Garcia, E. (2022) The Effects of Co-Exposure to Extremes of Heat and Particulate Air Pollution on Mortality in California: Implications for Climate Change. *American Journal of Respiratory and Critical Care Medicine*, June 21, 2022, rccm.202204-06570C. <https://doi.org/10.1164/rccm.202204-06570C>
 16. **Silva, S. J.**, Keller, C. A, and Hardin, J. (2022) Using an Explainable Machine Learning Approach to Characterize Earth System Model Errors: Application of SHAP Analysis to Modeling Lightning Flash Occurrence. *JAMES*, 14, e2021MS002881. <https://doi.org/10.1029/2021MS002881>
 15. Galmarini, S., Makar, P., Clifton, O. E., Hogrefe, C., Bash, J. O., Bellasio, R., Bianconi, R., Bieser, J., Butler, T., Ducker, J., Flemming, J., Hodzic, A., Holmes, C. D., Kioutsioukis, I., Kranenburg, R., Lupascu, A., Perez-Camanyo, J. L., Pleim, J., Ryu, Y.-H., San Jose, R., Schwede, D., **Silva, S. J.**, and Wolke, R. (2021) Technical note: AQMEII4 Activity 1: evaluation of wet and dry deposition schemes as an integral part of regional-scale air quality models. *Atmos. Chem. Phys.*, 21, 15663–15697, <https://doi.org/10.5194/acp-21-15663-2021>
 14. **Silva, S. J.**, Ma, P.-L., Hardin, J. C., and Rothenberg, D. (2021) Physically Regularized Machine Learning Emulators of Aerosol Activation. *Geosci. Model Dev.* 14, no. 5 (May 28, 2021): 3067–77. <https://doi.org/10.5194/gmd-14-3067-2021>
 13. **Silva, S. J.**, Burrows S. M., Evans M. J., and Halappanavar M. (2021) A Graph Theoretical Intercomparison of Atmospheric Chemical Mechanisms. *Geophys. Res. Lett.* 48, e2020GL090481. <https://doi.org/10.1029/2020GL090481>
 12. **Silva, S. J.**, Ridley, D. A., and Heald, C. L. (2020). Exploring the constraints on simulated aerosol sources and transport across the North Atlantic with island-based sun photometers. *Earth and Space Science*, 7, e2020EA001392. <https://doi.org/10.1029/2020EA001392>
 11. **Silva, S. J.**, Heald, C. L., and Guenther, A. B. (2020) Development of a Reduced Complexity Plant Canopy Physics Surrogate Model for use in Chemical Transport Models: A Case Study with GEOS-Chem v12.3.0, *Geosci. Model Dev.* 13, no. 6 (June 3, 2020): 2569–85. <https://doi.org/10.5194/gmd-13-2569-2020>
 10. Clifton, O. E., Fiore, A. M. , Massman, W. J., Baublitz, C. B., Coyle, M., Emberson, L., Fares, S., Farmer, D. K., Gentine, P., Gerosa, G., Guenther, A. B., Helmig, D., Lombardozzi, D. L., Munger, J. W., Patton, E. G., Pusede, S. E., Schwede, D. B., **Silva, S. J.**, Sörgel, M., Steiner, A. L., and Tai, A. P. K., (2020) Dry deposition of ozone over land: processes, measurements and modeling, *Reviews of Geophysics*, 58, e2019RG000670. <https://doi.org/10.1029/2019RG000670>

9. Wong, A. Y. H., Geddes, J.A., Tai, A.P.K., and **Silva, S. J.** (2019) Importance of Dry Deposition Parameterization Choice in Global Simulations of Surface Ozone, *Atmos. Chem. Phys.*, 19, no. 22: 14365–85. <https://doi.org/10.5194/acp-19-14365-2019>.
8. **Silva, S. J.**, Heald, C. L., Ravela, S., Mammarella, I., and Munger, J.W. (2019). A Deep Learning Parameterization for Ozone Dry Deposition Velocities. *Geophys. Res. Lett.*, 46. <https://doi.org/10.1029/2018GL081049>
7. **Silva, S. J.**, Heald, C. L., and Li, M. (2018). Space-Based Constraints on Terrestrial Glyoxal Production. *JGR: Atmospheres*, 123, 13, 583–13, 594. <https://doi.org/10.1029/2018JD029311>
6. **Silva, S. J.**, Barbieri, L. K., and Thomer, A. K. (2018). Observing Vegetation Phenology through Social Media. *PLOS ONE* 13, no. 5 (May 10, 2018): e0197325. doi:10.1371/journal.pone.0197325.
5. **Silva, S. J.** and Heald, C. L. (2018). Investigating dry deposition of ozone to vegetation. *JGR: Atmospheres*, 123, 559–573. doi:10.1002/2017JD027278
4. **Silva, S. J.** and Arellano, A. F. (2017). Characterizing Regional-Scale Combustion Using Satellite Retrievals of CO, NO₂ and CO₂. *Remote Sensing* 2017, 9, 744, doi:10.3390/rs9070744
3. **Silva, S. J.**, Heald, C. L., Geddes, J. A., Austin, K. G., Kasibhatla, P. S., and Marlier, M. E. (2016). Impacts of current and projected oil palm plantation expansion on air quality over Southeast Asia, *Atmos. Chem. Phys.*, 16, 10621-10635, doi:10.5194/acp-16-10621-2016
2. Geddes J.A., Heald C. L., **Silva, S. J.**, and Martin R. V. (2016). Land cover change impacts on atmospheric chemistry: simulating large-scale tree mortality in the United States. *Atmos. Chem. Phys.* 16, 2323-2340, doi:10.5194/acp-16-2323-2016
1. **Silva, S. J.**, Arellano, A. F., and Worden, H. (2013). Toward anthropogenic combustion emission constraints from space-based analysis of urban CO₂/CO sensitivity, *Geophys. Res. Lett.*, 40, doi:10.1002/grl.50954.

PRESENTATIONS

Invited Seminars

- 2023 University of Arizona, HAS/Statistics & Data Sciences
- 2023 University of Virginia, School of Data Science
- 2023 Columbia University, LEAP NSF STC Journal Series
- 2022 Harvard University, Atmospheric & Environmental Chemistry Seminar Series
- 2022 University of Illinois Urbana-Champaign, Department of Atmospheric Sciences
- 2022 University of Southern California, Information Sciences Institute
- 2022 University of Southern California, Department of Civil & Environmental Engineering
- 2022 CityAir/University of Arizona, Department of Applied Mathematics
- 2021 City University of Hong Kong, School of Energy & Environment
- 2021 University of Southern California, Department of Earth Sciences
- 2021 University of Michigan, Department of Climate & Space Sciences and Engineering

2021 University of Arizona, Department of Chemical & Environmental Engineering
 2021 Yale University, Department of Chemical & Environmental Engineering
 2021 NASA Global Modeling and Assimilation Office
 2020 University of Virginia, Department of Environmental Sciences
 2020 Purdue University, Department of Earth, Atmospheric, & Planetary Sciences
 2020 University of Arizona, Department of Hydrology & Atmospheric Sciences
 2020 Reed College, Department of Chemistry
 2019 NASA Langley Research Center
 2019 Pacific Northwest National Laboratory

Conference Presentations († = Invited)

2023 AMS Annual Meeting, Virtual, *Oral Presentation*
 2022 AGU Fall Meeting, Virtual, *Oral Presentation*
 2022 Atmospheric Chemical Mechanisms Conference, Davis, CA, *Poster Presentation*
 2022 ACTIVATE Science Team Meeting, Tucson, AZ, *Oral Presentation*
 2021 AGU Fall Meeting, Virtual, *Poster Presentation*
 2021[†] International Aerosol Modeling Algorithms Conference, Virtual, *Oral Presentation*
 2021 16th IGAC Science Conference, Virtual, *Poster Presentation*
 2021 PNNL TechFest, Virtual, *Oral Presentation*
 2021 Physics Informed Machine Learning Workshop@PNNL, Virtual, *Oral Presentation*
 2020 AGU Fall Meeting, Virtual, *Poster Presentation*
 2020 Atmospheric Chemical Mechanisms Conference, Virtual, *Oral Presentation*
 2020[†] MIT Earth Systems and Signals Group, Virtual, *Oral Presentation*
 2020 DOE ESMD/E3SM PI Meeting, Virtual, *Oral Presentation*
 2020 DOE ARM/ASR Machine Learning Workshop, Virtual, *Oral Presentation*
 2020 PNNL POGO Research Symposium, Richland, WA, *Poster Presentation*
 2019 AGU Fall Meeting, San Francisco, CA, *Poster Presentation*
 2019[†] MAC-MAQ, UC Davis, Davis, CA, *Oral Presentation*
 2019 Atmospheric Chemistry GRC, Newry, ME, *Poster Presentation*
 2019 Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS) XV, Brookhaven National Laboratory, Upton, NY, *Oral Presentation*
 2019 9th International GEOS-Chem Conference, Cambridge, MA, *Poster Presentation*
 2018 AGU Fall Meeting, Washington DC, *Poster Presentation*
 2018 iCACGP/IGAC, Takamatsu, Japan, *Poster Presentation*
 2017 Ozone Dry Deposition Workshop, LDEO, Palisades, NY, *Oral Presentation*
 2017 8th International GEOS-Chem Conference, Cambridge, MA, *Oral Presentation*
 2016 AGU Fall Meeting, San Francisco, CA., *Poster Presentation*
 2015 AGU Fall Meeting, San Francisco, CA., *Poster Presentation*
 2015 7th International GEOS-Chem Meeting, Cambridge, MA., *Poster Presentation*
 2014 IWGGMS 10, Noordwijk, The Netherlands, *Oral Presentation*
 2013 IWGGMS 9, Yokohama, Japan, *Oral Presentation*
 2013 AGU Fall Meeting, San Francisco, CA., *Poster Presentation*
 2012 AGU Fall Meeting, San Francisco, CA., *Oral Presentation*
 2012 Honors College Research Symposium, University of Arizona, *Poster Presentation*

AWARDS & HONORS

Wrigley Institute Faculty Innovation Award (USC)	2022
Linus Pauling Distinguished Postdoctoral Fellowship	2019-2021
Best Doctoral Thesis: MIT Civil and Environmental Engineering	2020
Invited Participant: Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESS) XV	2019
NASA Earth and Space Sciences Fellowship	2016-2019
John Hennessy OGE Fellowship (MIT)	2018
Earth Science Information Partners Seed Grant	2017
Earth Science Information Partners (ESIP) Student Fellow	2016
Poster Award – 7th International GEOS-Chem Meeting	2015
University of Arizona College of Science Graduate Student Award for Research	2014
University of Arizona College of Science Galileo Circle Scholarship	2013
NASA SpaceGrant (University of Arizona)	2011
University of Arizona Honors Research Grant	2011
University of Arizona Wildcat Excellence Award	2009

INSTITUTIONAL SERVICE

University of Southern California:

Earth Sciences Computer Committee	2022-present
Earth Sciences Graduate Admission Committee	2021-present
Faculty Advisor for Sigma Gamma Epsilon Earth Science Undergraduate Honor Society	2023-present
Civil and Environmental Engineering Faculty Search Committee	2022-2023
Earth Sciences Merit Review Committee	2022

Pacific Northwest National Laboratory:

Earth and Biological Science Directorate Diversity and Inclusion Council	2020-2021
Earth and Biological Science Directorate Strategy Workshops on Data Driven Discovery using AI/ML	2021
Reading Groups Organized:	
Machine Learning for Earth Science	2021
Young Scientist Paper Discussion Group	2020
Staff Interview Panelist:	
Atmospheric Science and Global Change Division Director	2021
Earth System Modeling Group Lead	2021
Machine Learning and Climate Science Staff Scientist	2021
Various Postdoctoral Candidates	2019-2021

PROFESSIONAL ACTIVITIES

California Air Resources Board: Research Screening Committee	2023-Present
Society for Advancement of Chicanos/Hispanics and Native Americans in Science	
Distinguished Awards Task Force	2022
National Diversity in Stem Conference – Applicant Review	2022
Reviewed: Travel Scholarship, Research Presentations, & Session Proposals	
Steering Group: Air Quality Model Evaluation International Initiative 4	2017-2022

DOE Artificial Intelligence for Earth System Predictability (AI4ESP) Workshop Session Co-Chair – Aerosols and Clouds	2021
Careers Panelist: El Día del Agua y la Atmósfera Dept. of Hydrology and Atmospheric Sciences, The University of Arizona	2021
National Science Olympiad: Meteorology/Climate Rules Review	2021
<i>Proposal Reviewer:</i> NSF, NOAA, DOE, NASA, DOE/PNNL Visiting Faculty Program, Climate Change A.I. Innovation Grants, Israeli Science Foundation (ISF), US Army Corps of Engineers	
<i>Journal Referee:</i> ACS Earth and Space Chemistry, Aerosol Science & Technology, Atmosphere, Atmospheric Chemistry and Physics, Environmental Science & Technology, Geophysical Research Letters, Geoscientific Model Development, Global Biogeochemical Cycles, Journal of Advances in Model Earth Systems, Journal of Applied Meteorology and Climatology, Journal of Geophysical Research: Atmospheres, Journal of Open Source Software, Science Advances	
<i>Academic Conference Activities</i>	
International Aerosol Modeling Algorithms (IAMA): Technical Program Committee	2023
ICLR Climate Change AI Workshop Program Committee: Tackling Climate Change with Machine Learning	2023
<i>Conference Sessions Organized</i>	
AMS Annual Meeting: A.I. in Weather and Climate Modeling: Bridging the Gap Between Theoretical Advances and Production Use	2022
AGU Fall Meeting: A.I. in Weather and Climate Modeling: From Theoretical Advances to Operational Use	2021
AMS Annual Meeting: Machine-Learning Applications for Atmospheric Chemistry	2021
AGU Fall Meeting: Biosphere-Atmosphere Interactions and Atmospheric Chemistry	2020
AGU Fall Meeting: Biosphere-Atmosphere Interactions and Atmospheric Chemistry	2019
9 th International GEOS-Chem Conference: Machine Learning and GEOS-Chem	2019
<i>Professional Organization Membership</i>	
American Geophysical Union	
American Meteorological Society	
Society of Hispanic Professional Engineers	
Society for Advancement of Chicanos/Hispanics and Native Americans in Science	

ADVISING & MENTORSHIP

University of Southern California:

PhD Advising

Hannah Schlaerth, Civil and Environmental Engineering	2022-2023
Kayley Butler, Civil and Environmental Engineering	2022-present
Obin Sturm, Earth Sciences	2022-present

Master's Student Advising

Sahithi Nandyala, Applied Data Science	2022-present
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Undergraduate Researchers

William Yik, Computer Science and Mathematics*	2022-present
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Undergraduate at Harvey Mudd College Kyla Gordon, Environmental Studies and Earth Sciences	2022-present
Awarded USC URAP funding Katherine Mottola, Earth Sciences	2023-present
*Sp 2023 Direct Research Units Emy Li, Applied Mathematics and Economics	2023-present

PhD Thesis Committee Member

Jason Ezra Williams, Physics	2023
Joseph Ko, Civil and Environmental Engineering	2022
Yun Li, Civil and Environmental Engineering	2022

PhD Exam Committee Member

Diego Aguilera, Civil and Environmental Engineering Screening Exam	2022
Joseph Ko, Civil and Environmental Engineering Qualifying Exam	2022
Vahid Farahani, Civil and Environmental Engineering Qualifying Exam	2022
Alexander James, Earth Sciences Qualifying Exam	2022

Pacific Northwest National Laboratory:

Student Mentor: DOE Computational Science Graduate Fellowship	2021
Earth Science Mentor Match: Mentor	2020

Massachusetts Institute of Technology:

Undergraduate Research Mentor	2019
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TEACHING

GEOL/PM 599 – Data Science Methods for Climate Change and Health Research Co-taught with faculty in the Keck School of Medicine	Sp 2023
GEOL 515 – Introduction to Atmospheric Science	Sp 2023
USC Sustainability Across the Curriculum Initiative Faculty Development Workshop: Invited Speaker & Participant	2023
USC Sustainability Across the Curriculum Initiative Teaching Grant \$10,000 in funds to support course development	2023
National Association of Geoscience Teachers Workshop for Early Career Geoscience Faculty: Participant	2022
Invited Guest Lecture: The University of Arizona Course: Data Assimilation	2020, 2022
PNNL Teacher-Scientist Program Development	2021
Teaching Certificate: MIT Teaching and Learning Laboratory	2018
MIT edX: Curriculum Development Developed randomized problem/solution sets for a large (> 1000 student) Massive Open Online Course	2016

Updated: 07/2023

Teaching Assistant: Remote Sensing

2013

The University of Arizona, for senior undergraduate and early graduate students