SHUCHANG LIU

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RESEARCH EXPERIENCE

Massachusetts Institute of Technology Cambridge, USA

Postdoctoral researcher Jun. 2024 – present

- A physically-constrained downscaling approach based on dynamical downscaling and machine learning (funded by Swiss National Science Foundation Postdoc Mobility fellowship, CHF 128k)
- Constraining precipitation uncertainty under climate change using machine learning (MIT Climate Grand Challenges Initiative)
- Generalized convection parameterization: adapting current-climate trained models for warmer climates (Affiliate scientist of Multiscale Machine Learning In Coupled Earth System Modeling)

ETH Zürich Zürich, Switzerland

Postdoctoral researcher Oct. 2023 – May. 2024

- How to deal with double-ITCZ when downscaling in the tropics

PhD candidate Oct. 2020 – Sep. 2023

- The potential of high-resolution climate models in the tropics in constraining climate-change uncertainties

Tsinghua University Beijing, China

Student Researcher Sep. 2017 - June 2020

- The impact of climate mitigation pathways on the heatwave and air pollution-related human health in China

EDUCATION

ETH Zürich Zürich, Switzerland

PhD Atmospheric and Climate Science Sep. 2023

Tsinghua University Beijing, China

M.S. Environmental Sciences and Engineering; outstanding graduate June 2020

Nanjing University Nanjing, China

B.S. Environmental Engineering; outstanding graduate July 2017

CONFERENCE PRESENTATIONS

American Geophysical Union Meeting San Francisco, USA

Oral presentation Dec 2023

- Bias-corrected Dynamical Downscaling: Motivation, Methodology and Application to Cloud Feedbacks in the Tropics

European Geophysical Union Meeting Vienna, Austria

Oral presentation April 2023

- Understanding the Double-ITCZ Problem over the Atlantic with Bias-corrected Downscaling

European Geophysical Union Meeting Vienna, Austria

Oral presentation May 2022

- Systematic Calibration of A Convection-Resolving Model: Application over Tropical Atlantic

TEACHING EXPERIENCES

Bachelor's Courses

Risk analysis of environmental health Tsinghua University

Numerical method in environmental physics, Environmental Systems, Python in Geosciences ETH Zürich

Master's Courses

Numerical modeling of weather and climate models ETH Zürich

Bachelor's Thesis
Visualisation of simulated clouds over the Atlantic ETH Zürich
Master's Thesis
Extreme Heat Waves Over the Persian Gulf ETH Zürich

PUBLICATIONS

Liu, S., Paul A. O'Gorman. CERA: A Framework for Improved Generalization of Machine Learning Models to Changed Climates. *Submitted to Journal of Advances in Modeling Earth Systems.*

Liu, S., Zeman, C., & Schär, C. (2025). Assessing cloud feedbacks over the Atlantic with bias-corrected downscaling. *Journal of Advances in Modeling Earth Systems*, 17, e2024MS004661.

Wang, Y., Liu, Y., **Liu, S.**, Wang, B., Duan, X., Wang, S., & Zhao, B. (2025). Changing climate alters the time people spend outdoors. *Sustainable Horizons*, 13, 100133.

Liu, S., Zeman, C., & Schär, C. (2024). Dynamical Downscaling of Climate Simulations in the Tropics. *Geophysical Research Letters*, 51, e2023GL105733.

Yao, M., Niu, Y., **Liu, S.**, Liu, Y., Kan, H., Wang, S., ... & Zhao, B. (2023). Mortality burden of cardiovascular disease attributable to ozone in China: 2019 vs 2050. *Environmental Science & Technology*, 57(30), 10985-10997.

Jiang, Y., Ding, D., Dong, Z., **Liu, S.**, Chang, X., Zheng, H., ... & Wang, S. (2023). Extreme emission reduction requirements for china to achieve world health organization global air quality guidelines. *Environmental Science & Technology*, 57(11), 4424-4433.

Liu, S., Zeman, C., Sørland, S. L., & Schär, C. (2022). Systematic Calibration of a Convection-Resolving Model: Application over Tropical Atlantic. *Journal of Geophysical Research: Atmospheres*, e2022JD037303.

Liu, Y., **Liu, S.**, Wang, S., & Zhao, B. (2022). How will window opening change under global warming: A study for China residence. *Building and Environment*, 209, 108672.

Liu, S., Xing, J., Wang, S., Ding, D., Cui, Y., & Hao, J. (2021). Health benefits of emission reduction under 1.5℃ pathways far outweigh climate-related variations in China. *Environmental Science & Technology*, 55(16), 10957-10966.

Liu, S., Xing, J., Sahu, S. K., Liu, X., **Liu, S.**, Jiang, Y., ... & Wang, S. (2021). Wind-blown dust and its impacts on particulate matter pollution in Northern China: current and future scenarios. *Environmental Research Letters*, 16(11), 114041.

Liu, S., Xing, J., Wang, S., Ding, D., Chen, L., Hao, J. (2020). Revealing the impacts of transboundary pollution on $PM_{2.5}$-related deaths in China. *Environment International*, 134, 105323.

Xing, J., Lu, X., Wang, S., Wang, T., Ding, D., Yu, S., ... & Hao, J. (2020). The quest for improved air quality may push China to continue its CO2 reduction beyond the Paris Commitment. *Proceedings of the National Academy of Sciences*, 117(47), 29535-29542.

Wang, S., **Liu, S.** (2019). Air pollution and lung cancer risks. In: Nriagu, J.O. (Ed.), *Encyclopaedia of environmental health, 2nd Edition*. Elsevier Science.