Yuan Sun

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Career

2026.09 – present ◇ **Postdoctoral researcher, National University of Singapore, Singapore.**
Host: Prof. Matthias Roth

Education

2023.07 – 2026.06 ◇ **Ph.D. in Environmental Science, The University of Manchester, UK.**
Supervisors: Dr. Zhonghua Zheng, Prof. David Topping, and Prof. David Schultz
Thesis: Improving urban climate modeling within the Earth system model framework to support adaptation

2020.09 – 2023.03 ◇ **M.A. (Hons) in Architecture, Zhejiang University, China.**
First Class Honours
Supervisor: Prof. Zhu Wang

2015.09 – 2020.06 ◇ **B.A. (Hons) in Architecture, Zhejiang University, China.**
2019.01–2019.05 (Exchange) National University of Singapore, Singapore
First Class Honours

Research Interests

◇ **Urban climate: observation, modeling, impact assessment, and adaptation**
Topics:

- Urban boundary layer
- Local climate zones
- Anthropogenic heat
- Cooling effects of white roofs

◇ **Multi-scale Earth system modeling and development**
By model scale:

- Earth system model: Community Earth System Model (CESM)
- Regional climate model: Weather Research & Forecasting Model (WRF)

By model component:

- Atmosphere model: Community Atmosphere Model (CAM), CAM-Chem
- Land surface model: Community Terrestrial Systems Model (CTSM), Joint UK Land Environment Simulator (JULES)
- Urban model: Community Land Model-Urban (CLMU), Noah Single-Layer Urban Canopy Model (Noah-SLUCM), Met Office-Reading Urban Surface Exchange Scheme (MORUSES)

Research Publications

Earth system modeling

1. **Sun**, **Y.**, Oleson, K. W., & Zheng, Z. (2026). Modeling urban traffic heat flux in the Community Earth System Model: Formulation and validation for two test sites. *Journal of Advances in Modeling Earth Systems*, *18*(4), e2025MS005435. https://doi.org/10.1029/2025MS005435
2. **Sun**, **Y.**, Oleson, K. W., Zhao, L., Mills, G., He, C., Demuzere, M., Topping, D. O., Zhang, N., & Zheng, Z. (2025). Enhancing global-scale urban land cover representation using local climate zones in the Community Earth System Model. *Journal of Advances in Modeling Earth Systems*, *17*(11), e2025MS004934. https://doi.org/10.1029/2025MS004934
3. **Sun**, **Y.**, Fang, B., Oleson, K. W., Zhao, L., Topping, D. O., Schultz, D. M., & Zheng, Z. (2024). Improving urban climate adaptation modeling in the Community Earth System Model (CESM) through transient urban surface albedo representation. *Journal of Advances in Modeling Earth Systems*, *16*(12), e2024MS004380. https://doi.org/10.1029/2024MS004380

Climate impact assessment

1. **Sun**, **Y.**, Lindley, S., & Zheng, Z. (2026). Linking urban population exposure to heatwaves with land cover change across the UK. *Sustainable Cities and Society*, *144*, 107349. https://doi.org/10.1016/j.scs.2026.107349

Built environment & Geography

1. **Sun**, **Y.** (2025). Mapping urban morphological prototypes: Unveiling local identity in historic water towns of the Northern Zhejiang Plain, China. *Geocarto International*, *40*(1), 2547011. https://doi.org/10.1080/10106049.2025.2547011
2. **Sun**, **Y.**, Wu, Y., Yu, H., & Li, Y. (2025). County-level urban forms and their correlation with local governance in Jiande, China: Evidence from historical records. *Journal of Asia Architecture and Building Engineering*, *24*(3), 1985–1998. https://doi.org/10.1080/13467581.2024.2322000
3. **Sun**, **Y.**, Wu, Y., Yu, H., & Li, Y. (2024). Spatiotemporal evolution of urban landscapes in Chinese historic water towns (1918-2021). *Landscape Research*, *49*(4), 568–583. https://doi.org/10.1080/01426397.2024.2322138

Others (Co-author)

1. Zhang, Y., Xia, J., **Sun**, **Y.**, Liu, B., Yao, X., Jiang, F., Yu, J., Sun, M., & Zheng, Z. (2027). LCZFormer: Learning factorized urban surface–climate representations for cross-city urban climate emulation. *Proceedings of the 33rd ACM SIGKDD Conference on Knowledge Discovery and Data Mining*.
2. Liu, D., Jiang, F., Hu, K., Ding, S., Wang, X., Wu, H., Yang, Y., Zheng, Z., … Coe, H. (2026). Warming potential of atmospheric black carbon modulated by particulate matter. *Nature Geoscience*, *19*, 1174–1181. https://doi.org/10.1038/s41561-026-02068-0
3. Xia, J., **Sun**, **Y.**, Ling, F., Lindley, S., Liu, J., Ye, X., Bannan, T. J., Evans, J., … Zheng, Z. (2026). Optimized lcz mapping with automated machine learning reveals thermal disparities during a heatwave event. *Urban Climate*, *68*. https://doi.org/10.1016/j.uclim.2026.103001
4. Wang, Y., Zheng, Z., **Sun**, **Y.**, Yao, Y., Ma, P.-L., Zhang, A., Zhu, S., Zhang, Z., … Li, W. (2025). Improved representation of black carbon mixing structures suggests stronger direct radiative heating. *One Earth*, *8*(5), 101311. https://doi.org/10.1016/j.oneear.2025.101311
5. Yu, J., **Sun**, **Y.**, Lindley, S., Jay, C., Topping, D. O., Oleson, K. W., & Zheng, Z. (2025). Integration and execution of Community Land Model Urban (CLMU) in a containerized environment. *Environmental Modelling & Software*, *188*, 106391. https://doi.org/10.1016/j.envsoft.2025.106391

6 Xia, B., Wu, K., Guo, P., **Sun, Y.**, Wu, J., Xu, J., & Wang, S. (2022). Multidisciplinary innovation adaptability of campus spatial organization: From a network perspective. *SAGE Open*, *1–3*, 21582440221079929. https://doi.org/10.1177/21582440221079929

7 Zheng, Y., **Sun, Y.**, Wang, Z., & Liang, F. (2022). Developing green–building design strategies in the Yangtze River Delta, China through a coupling relationship between geomorphology and climate. *Land*, *12*(1), 6. https://doi.org/10.3390/land12010006

Conferences & Talks

LCZ-PARAM2D: Global urban parameters with local climate zone representation for Earth system modeling

- **Oral** presentation at 31th Annual CESM Workshop (2026)

Advancing CLMU for regional urban climate simulations through WRF coupling: intercomparison with NOAH–SLUCM

- **Oral** presentation at 2026 Joint MPAS/WRF User Workshop
- **Oral** presentation at Land Model and Biogeochemistry Working Group Meeting of CESM 2026 Winter Working Group Meetings

Modeling Urban Traffic Heat Flux in the Community Earth System Model: Formulation and Validation for Two Test Sites

- **Oral** presentation at European Geosciences Union General Assembly 2026 (EGU26)
- **Oral** presentation at 30th Annual CESM Workshop (2025)

Enhancing Global-Scale Urban Land Cover Representation Using Local Climate Zones in the Community Earth System Model

- **Poster** presentation at the 106th AMS Annual Meeting (2026)
- **Oral** presentation at Land Model and Biogeochemistry Working Group Meeting of CESM 2025 Winter Working Group Meetings
- **Poster** presentation at the 21st Annual Meeting Asia Oceania Geosciences Society (AOGS) (2024)

Improving Urban Climate Adaptation Modeling in the Community Earth System Model (CESM) Through Transient Urban Surface Albedo Representation

- **Oral** presentation at the 12th International Conference on Urban Climate (ICUC12) (2025)
- **Oral** presentation at the 29th Annual CESM Workshop (2024)

Awards

2026 ◇ **Third Place Best Urban Student Poster Presentation, American Meteorological Society (AMS)**, awarded for a poster presentation at the 16th Symposium on Urban Environment of the 106th AMS Annual Meeting ($50).

2024 ◇ **Best Student Poster Award, Asia Oceania Geosciences Society (AOGS)**, awarded for a poster presentation in the atmospheric sciences section.

2019 ◇ **Chu Kochen Scholarship**, awarded annually to 12 undergraduates at Zhejiang University (¥10,000).

2021, 2019, 2018, 2017, 2016 ◇ **China National Scholarship** (¥8,000).

Professional Qualifications

2025 ◇ **Associate Fellow of Advance HE (AFAHE)**, awarded by Advance HE.

Teaching & Mentoring

Postgraduate student

2024–2025, 2023–2024 Spring & Summer ◇ **Graduate Teaching Assistant**
Earth and Environmental Data Science

Undergraduate student

2025–2026 Fall & Winter ◇ **Graduate Teaching Assistant**
Meteorology and Forecasting

2024–2025 Spring & Summer ◇ **Graduate Teaching Assistant**
Natural Scientists Toolkit: Computer Programming

2024–2025, 2023–2024 Spring & Summer ◇ **Graduate Teaching Assistant**
Geospatial Techniques

2025–2026, 2024–2025, 2023–2024 Fall & Winter ◇ **Graduate Teaching Assistant**
Design 1 (Civil)

2020–2021, 2021–2022 ◇ **Zhejiang University Counselor**
Part-time

Secondary student

2024–2025, 2023–2024 Summer & Fall ◇ **Manchester Access Program (MAP) Tutor**

Media Coverage

2026 ◇ **Forbes**, *600 Million People Can't Stay Cool. The 'Hot City' Problem Is Growing*, 29 May.

◇ **The University of Manchester news**, *Heat from traffic is contributing to rise in city temperatures, new study finds*, 8 April.

2025 ◇ **The University of Manchester news**, *Enhanced climate models to reveal how our cities are driving and feeling the effects of climate change*, 12 November.

Academic Service

Editor ◇ 2026–present, Academic Editor, PLOS Climate

Reviewer ◇ AMS: Journal of Climate
ELSEVIER: Environmental Impact Assessment Review, Environmental Modelling and Software, Journal of Building Engineering, Sustainable Cities and Society, Urban Climate
MyJoVE: Journal of Visualized Experiments
MDPI: Architecture, Applied Sciences, Land
PLOS: PLOS Climate
SAGE: SAGE Open
Springer Nature: Applied Spatial Analysis and Policy, Discover Cities, Scientific Reports, Theoretical and Applied Climatology
Taylor & Francis: Journal of Asian Architecture and Building Engineering, Landscape Research
World Scientific: Surface Review and Letters