

Zhen Qian

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EDUCATION

Technical University of Munich <i>Doctoral student in Earth System Modeling</i> <i>Supervisor: Prof. Dr. Niklas Boers (ESM group)</i>	03/2024 – Present <i>Munich, Germany</i>
Nanjing Normal University <i>M.S in GIScience (awarded National Scholarship)</i> <i>Supervisor: Prof. Dr. Min Chen (OpenGMS group)</i>	09/2020 – 06/2023 <i>Nanjing, China</i>
Nantong University <i>B.S in GIScience (awarded National Scholarship)</i>	09/2016 – 06/2020 <i>Nantong, China</i>

RESEARCH EXPERIENCES

Potsdam Institute for Climate Impact Research <i>Guest researcher</i>	03/2024 – Present <i>Potsdam, Germany</i>
Nanjing Normal University <i>Research Assistant</i>	07/2023 – 02/2024 <i>Nanjing, China</i>

RESEARCH INTERESTS

- Coupled Human and Natural Systems**
Terrestrial carbon dynamics; Forest loss and resilience; Sustainable urban environment
- Data-driven (and Hybrid) Modeling**
Probability and statistics; Machine learning; Deep learning; Generative AI
- Geoinformatics and Remote Sensing**
Space-time data curation, processing, analysis, modeling and visualization

RESEARCH OUTPUTS

Publication statistics

- More than 20 peer-reviewed publications (9 as first author, including *Nature Reviews Earth & Environment*, *Nature Geoscience*, *Earth System Science Data*, *Sustainable Cities and Society*)
- Citations: 522; h-index: 13; i10-index: 13 (statistics by [Google Scholar](#))

Recent featured publications

(Note: “†” indicates equal contribution)

1. Chen, M. †, **Qian, Z.** †, Boers, N., Creutzig, F., Camps-Valls, G., Hubacek, K., Claramunt, C., Wilson, J., Nativi, S., Jakeman, A., Müller, D., ..., and Lü, G.: *Collaboration between artificial intelligence and Earth science communities for mutual benefit*, *Nature Geoscience* (2024). [[DOI](#)]

2. **Qian, Z.**, Chen, M., Sun, Z., Zhang, F., Xu, Q., Guo, J., Xie, Z. and Zhang, Z.: *Simultaneous extraction of diverse building information across large-scale urban landscapes using high-resolution satellite imagery*, *Sustainable Cities and Society* **106**, 105393 (2024). [\[DOI\]](#)
3. Chen, M. †, **Qian, Z.** †, Boers, N., Jakeman, A.J., Kettner, A.J., Brandt, M., Kwan, M.P., Batty, M., Li, W., Zhu, R., Luo, W., ..., and Lü, G.: *Iterative integration of deep learning in hybrid Earth surface system modelling*, *Nature Reviews Earth & Environment* **4**, 568-581 (2023). [\[DOI\]](#)
4. **Qian, Z.**, Chen, M., Yang, Y., Zhong, T., Zhang, F., Zhu, R., Zhang, K., Zhang, Z., Sun, Z., Ma, P., Lü, G. and Yan, J.: *Vectorized dataset of roadside noise barriers in China using street view imagery*, *Earth System Science Data* **14**, 4057-4076 (2022). [\[DOI\]](#)
5. **Qian, Z.**, Chen, M., Zhong, T., Zhang, F., Zhu, R., Zhang, Z., Zhang, K., Sun, Z. and Lü, G.: *Deep Roof Refiner: A detail-oriented deep learning network for refined delineation of roof structure lines using satellite imagery*, *International Journal of Applied Earth Observation and Geoinformation* **107**, 102680 (2022). [\[DOI\]](#)

Other publications (excluding featured ones)

2024

1. Liu, D., Cheng, W., **Qian, Z.**, Liu, J., Liu, J. and Wang, X.: *A global catalog of Martian impact craters with actual boundaries and degradation states*, *International Journal of Applied Earth Observation and Geoinformation* **131**, 103952 (2024). [\[DOI\]](#)
2. Zhang, Z., Pu, Y., Sun, Z., **Qian, Z.** and Chen, M.: *Assessment of Rooftop Photovoltaic Potential Considering Building Functions*, *Remote Sensing* **16**, 2993 (2024). [\[DOI\]](#)
3. Xie, Z., Wu, Y., Ma, Z., Chen, M., **Qian, Z.**, Zhang, F., Sun, L. and Peng, B.: *An urban building use identification framework based on integrated remote sensing and social sensing data with spatial constraints*, *Geo-spatial Information Science*, 1-25 (2024). [\[DOI\]](#)
4. Zhang, K., Wang, D., Chen, M., Zhu, R., Zhang, F., Zhong, T., **Qian, Z.**, Wang, Y., Li, H., Wang, Y. and Lü, G.: *Power generation assessment of photovoltaic noise barriers across 52 major Chinese cities*, *Applied Energy* **361**, 122839 (2024). [\[DOI\]](#)
5. Zhao, T., Wang, S., Ouyang, C., Chen, M., Liu, C., Zhang, J., Yu, L., Wang, F., Xie, Y., Li, J., Wang, F., Grunwald, S., Wong, B., Zhang, F., **Qian, Z.**, ..., and Wang, L.: *Artificial intelligence for geoscience: Progress, challenges and perspectives*, *The Innovation*, 100691 (2024). [\[DOI\]](#)

2023

6. Zhu, Z., Chen, M., **Qian, Z.**, Li, H., Wu, K., Ma, Z., Wen, Y., Yue, S., and Lü, G.: *Documentation strategy for facilitating the reproducibility of geo-simulation experiments*, *Environmental Modelling & Software* **163**, 105687 (2023). [\[DOI\]](#)
7. Liu, D., Cheng, W., **Qian, Z.**, Deng, J., Liu, J., and Wang, X.: *Boundary delineator for Martian crater instances with geographic Information and deep learning*, *Remote Sensing* **15**, 4036 (2023). [\[DOI\]](#)
8. Zhu, R., Guo, D., Wong, M.S., **Qian, Z.**, Chen, M., Yang, B., Chen, B., Zhang, H., and Yan, J.: *Deep Solar PV Refiner: An advanced deep learning network for photovoltaic area segmentation from satellite imagery*, *International Journal of Applied Earth Observation and Geoinformation* **116**, 103134 (2023). [\[DOI\]](#)

9. Zhu, Z., Chen, M.*, Sun, L., **Qian, Z.**, He, Y., Ma, Z., Zhang, F., Wen, Y., Yue, S., and Lü, G.: *Reproducing computational processes in service-based geo-simulation experiments*, International Journal of Applied Earth Observation and Geoinformation **124**, 103520 (2023). [DOI]
10. Zhang, Z., Chen, M., Zhong, T., Zhu, R., **Qian, Z.**, Zhang, F., Yang, Y., Zhang, K., Santi, P., Wang, K., Pu, Y., Tian, L., Lü, G., and Yan, J.: *Carbon mitigation potential afforded by rooftop photovoltaic in China*, Nature Communications **14**, 2347 (2023). [DOI]
11. Zhu, R., Kwan, M., Perera, A., Fan, H., Yang B., Chen B., Chen M., **Qian, Z.**, Zhang, H., Zhang, X., Yang, J., Santi, P., Ratti, C., Li, W., and Yan, J.: *GIScience can facilitate the development of solar cities for energy transition*, Advances in Applied Energy **10**, 100129 (2023). [DOI]

2022

12. Zhang, K., **Qian, Z.**, Yang, Y., Chen, M., Zhong, T., Zhu, R., Lv, G. and Yan, J.: *Using street view images to identify road noise barriers with ensemble classification model and geospatial analysis*, Sustainable Cities and Society **78**, 103598 (2022). [DOI]
13. Zhang, Z., **Qian, Z.**, Zhong, T., Chen, M., Zhang, K., Yang, Y., Zhu, R., Zhang, F., Zhang, H., Zhou, F., Yu, J., Zhang, B., Lü, G. and Yan, J.: *Vectorized rooftop area data for 90 cities in China*, Scientific Data **9**, 66 (2022). [DOI]
14. Sun, Z., Zhang, Z., Chen, M., **Qian, Z.**, Cao, M., and Wen, Y.: *Improving the performance of automated rooftop extraction through geospatial stratified and optimized sampling*, Remote Sensing **14**, 4961 (2022). [DOI]
15. Zhang, K., Chen, M., Yang, Y., Zhong, T., Zhu, R., Zhang, F., **Qian, Z.**, Lü, G. and Yan, J.: *Quantifying the photovoltaic potential of highways in China*, Applied Energy **324**, 119600 (2022). [DOI]

2021 and before

16. **Qian, Z.**, Liu, X., Tao, F. and Zhou, T.: *Identification of urban functional areas by coupling satellite images and taxi GPS trajectories*, Remote Sensing **12**, 2449 (2020). [DOI]
17. **Qian, Z.**, Zhou, T., Tao, F., Fan, Z., Liu, H. and Lu, J.: *Cluster-Based Extraction Method of Entrances and Exits in AOI*, Geography and Geo-Information Science, **36**, 1-7 (2020, In Chinese) [DOI]
18. **Qian, Z.**, Zhou, T., Ma, P., Tao, F. and Liu, H.: *A Detection Method for Passenger Safety Based on GIS*, Journal of Transport Information and Safety **37**, 35-43 (2019, In Chinese) [DOI]
19. **Qian, Z.**, Zhou, T., Kang, T., Fan, Z. and Lu, J.: *Study on Discrimination Method of Urban Road Congestion Based on Taxi*, Logistics Engineering and Management, **40**, 118-120+112 (2018, In Chinese). [DOI]
20. Zhou, T., Liu, X., **Qian, Z.**, Chen, H. and Tao, F.: *Automatic identification of the social functions of areas of interest (AOIs) using the standard hour-day-spectrum approach*, ISPRS International Journal of Geo-Information **9**, 7 (2020). [DOI]
21. Zhou, T., Liu, X., **Qian, Z.**, Chen, H. and Tao, F.: *Dynamic update and monitoring of AOI entrance via spatiotemporal clustering of drop-off points*, Sustainability **11**, 6870 (2019). [DOI]
22. Zhong, T., Zhang, K., Chen, M., Wang, Y., Zhu, R., Zhang, Z., Zhou, Z., **Qian, Z.**, Lv, G. and Yan, J.: *Assessment of solar photovoltaic potentials on urban noise barriers using street-view imagery*, Renewable Energy **168**, 181-194 (2021). [DOI]

Working papers

(Note: “†” indicates equal contribution)

1. Zhang, Z.†, **Qian, Z.†**, ... Worldwide rooftop photovoltaic electricity generation can mitigate global warming. *Nature Climate Change*. [Major revision](#)

SELECTED AWARDS & HONORS

Awards

Provincial Excellent Master's Thesis	2024
Provincial Outstanding Graduates	2023
Pacemaker to Merit Student in University for Postgraduates	2022
Excellent Student Cadre in University for Postgraduates	2021
Provincial Excellent Undergraduate Thesis	2021
Provincial Excellent Student Cadre for Undergraduates	2019
Pacemaker to Merit Student in University for Undergraduates	2018
Excellent Student Cadre in University for Undergraduates	2017, 2019

Scholarships

President's Scholarship for Postgraduates	2023
<i>Ranked Top 0.1% Award amount: 10k ¥</i>	
National Scholarship for Postgraduates	2022
<i>Ranked Top 0.1% Award amount: 20k ¥</i>	
First Prize Scholarship in University for Postgraduates	2020, 2021, 2022
<i>Ranked Top 1% Award amount: 3×12k ¥</i>	
National Scholarship for Undergraduates	2018
<i>Ranked Top 0.1% Award amount: 8k ¥</i>	
Enterprise Scholarship for Undergraduates	2017, 2019
<i>Ranked Top 1% Award amount: 2×2.5k ¥</i>	
First Prize Scholarship in University for Undergraduates	2017, 2018, 2019
<i>Ranked Top 1% Award amount: 3×1.5k ¥</i>	

Contests

Second Prize in National Graduate Mathematical Modeling Contest	2020
<i>Team leader</i>	
Third Prize in National Software Engineering Design Contest	2019
<i>Individual</i>	
Second Prize in Beidou Sci. & Tech. Invention Contest in East China	2019
<i>Team leader</i>	
Meritorious Winner in COMAP's Mathematical Modeling Contest	2018
<i>Team leader</i>	
First Prize in National GIS Application Skills Contest	2017, 2018
<i>Team leader</i>	

RESEARCH GRANTS

Provincial Research and Practice Innovation Program	2022-2023
<i>Title: Spatial intelligent analysis considering geographic priors; PI</i>	<i>Funding amount: 15k ¥</i>
Provincial Research and Practice Innovation Program	2018-2019
<i>Title: Travel behavior detection based on artificial intelligence; PI</i>	<i>Funding amount: 8k ¥</i>

ACADEMIC ACTIVITIES

Reviewer Services

All Earth; Cities; Earth Science Informatics; Geo-spatial Information Science; IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing; International Journal of Applied Earth Observation and Geoinformation; Journal of Environmental Management; Scientific Reports; The Journal of Supercomputing

Presentations

The Ninth Conference on Virtual Geographic Environment	08/2023
<i>Title: Simultaneous extraction of building information across large-scale landscapes</i>	<i>Yanji</i>
The Eighth Conference on Virtual Geographic Environment	07/2022
<i>Title: Roof structural line delineation based on deep learning and satellite imagery</i>	<i>Ganzhou</i>

TEACHING EXPERIENCES

Spatio-temporal big data analysis methods	11/2023, 11/2022, 11/2021
Spatial data structure	09/2018
Fundamentals of GIS algorithms	05/2018
C/C++ language programming	05/2017

SPECIALIZED SKILLS

Languages

Mandarin (Native), English (Professional proficiency), German (Elementary)

Programming

Python (Proficient, including OpenCV, Pytorch, Numpy, Pandas, Matplotlib, GDAL, etc.), R, Matlab

Professional tools

ArcGIS, QGIS, GEE, etc