Jianming Liang

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Education

Peking University — **Beijing, China**
Master of Science, Urban and Regional Planning — *Sep.2023 - Present*

- Research Focus: Social segregation, transportation equity, residential mobility, and the conceptual integration of theories into urban studies
- Advisor: Asst. Prof. Ling Li and Prof. Pengjun Zhao
- GPA: 3.53/4.00

Sun Yat-sen University — **Guangzhou, China**
Bachelor of Engineering, Remote Sensing — *Sep.2019 - Jul.2023*

- Research Focus: Remote sensing for urban environments and digitalized buildings
- GPA: 3.67/4.00 (excluding political education and courses unrelated to urban studies)

Publications

(* indicates the corresponding author; † indicates co-first authors.)

Refereed publications

1. **Liang, J.**, Li, L.*, and Zhao, P., 2025. Bridging divides: The impact of subway accessibility on income segregation in Beijing. *Transportation Research Part D: Transport and Environment*, 147, 104936.
2. Li, L., Tan, Y.*, **Liang, J.**, and Zhao, P., 2025. Measuring mass displacement of urban renewal in Shenzhen, China: Using longitudinal mobile phone trajectory data. *Environment and Planning A: Economy and Space*, 0308518X251336904.
3. Li, L., Yu S., Luo Y.*, and **Liang, J.**, 2025. Upward or downward mobility? Unpacking the impact of subway development on residential relocation using mobile data. *Transportation Research Part A: Policy and Practice*. (Accepted)

Work-in-progress

1. **Liang, J.**, Li, L.*, and Zhao, P. State-led spatial restructuring and intensified workplace segregation in Beijing. (Submitted)
2. Li, L.†, **Liang, J,†**, and Zhao, P.*. Longitudinal changes in activity-space segregation during and after the COVID-19 pandemic in China.
3. **Liang, J.**, Li, L.*, and Zhao, P. The spillover and time-series effects of urban renewal on different urban elements.

Research Experience

Key Laboratory of Earth Surface System and Human-Earth Relations
Ministry of Natural Resources of China, Peking University **Shenzhen, China**

Team: Urban Renewal and Housing Research

Project1: Socio-Spatial Segregation in Chinese Metropolises

- Constructed a longitudinal dataset (2018-2023) of housing types, including high-priced formal housing, low-priced formal housing, informal housing (urban villages), dormitories, and affordable housing.
- Identified housing types for nearly 10 million monthly mobile phone users to classify population groups on a big-data platform.
- Calculated individual-level cross-group segregation in both work and non-work contexts, based on users' trajectory records, using an exposure index improved by incorporating temporal dimensions.
- Applied econometrics models (e.g., OLS, SEM, SVR) to examine the effects of subway expansion, urban spatial restructuring, and COVID-19 on socio-spatial segregation from diverse theoretical perspectives.

Project2: Travel-Related Carbon Emission Estimation

- Reconstructed precise travel trajectories (hundreds of billions of trips) for Shenzhen mobile phone users during 2018-2023, based on cell tower locations and road network data, and generated daily/monthly travel timelines.
- Classified residents' travel modes into walking, cycling, private car, bus, and subway using a random forest model, with features including travel speed, navigation app usage, and the match between travel trajectories and transport infrastructure.
- Estimated travel-related carbon emissions by mode using existing emission formulas and mapped the spatial distribution of urban travel-related carbon sources.

Project3: Mechanisms of Behavioral Response to Urbanization Processes

- Compiled a long-term dataset (2018-2023) covering residential locations, commuting and non-commuting travel behaviors, and built-environment attributes of mobile phone users.
- Evaluated residential relocation quality using SVM, based on changes in mobility, accessibility, and built-environment features before and after relocation.
- Investigated the impacts of urbanization processes—such as subway expansion, urban renewal, and urban spatial restructuring—on residents' activity spaces (residence, workplace, and leisure), and examined related social equity issues.
- Operationalized behavioral economics theories to interpret residents' behavioral response mechanisms.

Project4: Urban Transport Network Reconstruction and Optimization Strategies

- Compiled databases of road and subway networks (2018-2025) for major Chinese cities, including Beijing, Shanghai, Shenzhen, and Hangzhou.
- Reconstructed urban transport networks with OpenTripPlanner and NetworkX, and

calculated accessibility by integrating POI data.
- Conducted agent-based transport simulations with SUMO.
- Compared simulated results with observed traffic flows derived from mobile phone data, and optimized model parameters using a particle swarm optimization to reduce deviations from real-world values.

Team: Geospatial Artificial Imtelligence and Foundation Models

Project1: Urban Land Use Identification and Monitoring with Multi-Source Heterogeneous Spatial Big Data

- Collected multi-source datasets for London and Shenzhen, including LandSat-8 imagery, human mobility data, POIs, and geographic topology. Extracted urban land use features representing physical morphology, network relations, urban functions, and geographic structures by leveraging Sat-MAE, Node2Vec, Doc2Vec, and direct position encoding.
- Constructed multi-dimensional representation vectors by jointly coupling spatial and attribute features of urban land use.
- Developed a heterogeneous graph convolutional module that integrates topological adjacency and population mobility, enabling robust regional feature representation and dynamic monitoring of urban land use.

Others

Project1: Sentiment Analysis of Chinese Social Media on Legal Cases Concerning Women's Rights

- Collected over 50,000 official legal documents concerning women's rights, and applied LDA to identify key themes and their associated legal references protecting women's rights.
- Searched and web-scraped social media posts and comments related to the top four themes.
- Applied natural language models to perform sentiment scoring on posts and comments, and assessed public attitudes toward these themes.

Joint Center of Global Change Space Observation System

China Academy of Space Technology, Sun Yat-sen University **Zhuhai, China**

Team: Advanced Remote Sensing Technology

Project1: Shadow-Based Urban Building Height Inversion with ICESat-2

- Segmented rooftops, walls, and shadows from Sentinel-2 imagery using U-Net++.
- Estimated building heights based on the geometric relationship among geographic location, solar elevation angle, and shadow length, with rooftops and building footprints from Google Earth serving as references.
- Utilized ICESat-2 strip-based footprints as control points to generate city-scale, building-level height estimates.
- Inferred carbon emissions associated with building demolition and construction by comparing temporal changes in building heights.

Project2: Environmental Analysis of the Zhengzhou Flood Disaster Using D-InSAR

- Processed multiple pre- and post-event SAR ground-range images of the Zhengzhou flood to monitor vertical ground deformation at centimeter-level accuracy through multi-temporal D-InSAR.
- Captured deformation signals induced by flooding, groundwater loss, and construction activities.
- Leveraged Sentinel-1 SAR's 6-day revisit cycle and weather-independence to enable continuous monitoring of climate-related disasters and land-cover changes.
- Combined ascending and descending orbit imagery to reconstruct three-dimensional land-surface deformation, providing insights for the digital twin modeling of urban buildings.

Academic Conferences

The 2025 International Conference on China Urban Development (*Jul.2025*) **London, UK**

The 10th Applied Energy Symposium and Forum (*May.2024*) **Shenzhen, China**

The 6th National LiDAR Conference (China) (*Nov.2020*) **Beijing, China**

Selected Honors and Awards

Merit Student Award, Peking University *Oct, 2025*

Xie Yalong Scholarship, Peking University *Oct, 2025*

Interdisciplinary Award, 32nd Peking University Challenge Cup *Oct, 2024*

Excellence Award of the Mapping Category, 19th SuperMap GIS Contest *Nov, 2021*

First Prize of the High-Precision Mapping Contest for Autonomous Vehicles, 6th National LiDAR Conference (China) *Nov, 2020*

Research Skills

- **Database Creation & Management:** Housing Types, Socio-spatial Segregation, Urban Renewal, Population Mobility & Accessibility, Residential Relocation, Building Height Change, Travel-related Carbon Emissions, Enterprise Registration/POIs
- **Programming & Frameworks:** Python, C++/C, SQL+PostGIS+PySpark, Linux, PyTorch/Scikit-learn/JAX, JavaScript+HTML+CSS, MATLAB, IDL
- **Data Science & Analysis:** PostgreSQL/SparkSQL/HiveSQL, Google Earth Engine, Artificial Intelligence (DL/RL), Remote Sensing Data Processing, Econometrics (Stata/StataModels), ArcGIS/SuperMap/QGIS (+Arcpy), OpenTripPlanner/NetworkX, Web Scraping, Cloud Computing
- **Language:** Mandarin Chinese (Native), Cantonese Chinese (Native), English (Fluent)