

# Dr. Xiaolong Mi

Research Assistant Professor

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## Research Summary

Dr. Xiaolong Mi is a Research Assistant Professor specializing in **Global Navigation Satellite Systems (GNSS)** and **Low-Earth Orbit (LEO) technologies**. His research focuses on high-precision **satellite navigation** (PPP, RTK and PPP-RTK), precise orbit determination of LEO satellites, GNSS time and frequency transfer, **GNSS remote sensing**, and the application of **Artificial Intelligence (AI) in earth and space sciences**. He has published over **20 peer-reviewed papers** in top-tier journals, secured **significant research funding**, and received multiple awards for academic excellence.

## Education

- **Ph.D. in Spatial Sciences**, Curtin University, Australia (2020/10–2023/06)
- **Ph.D. in GNSS & Space Geodesy**, University of Chinese Academy of Sciences, China (2017/09–2022/10)
- **B.Sc. in Surveying Engineering**, Shandong University of Science and Technology, China (2013/09–2017/07)

## Professional Positions

- **Research Assistant Professor**, The Hong Kong Polytechnic University (2023/07–Present)
- **Casual Academic**, Curtin University, Australia (2022/07–Present)
- **Researcher Assistant**, Curtin University, Australia (2020/10-2023/06)
- **Research Assistant**, Institute of Geodesy and Geophysics, Chinese Academy of Sciences, China (2017/09-2022/10)

- **Research Assistant**, First Institute of Oceanography, Ministry of Natural Resources, China (2017/02-2017/06)

## Research Projects

### Principal Investigator (PI):

- Research on key technologies for real-time precise orbit determination and time synchronization of distributed satellite systems of low-earth orbit (LEO) based on satellite-based PPP services (CNY¥300,000, 2025–2027, **National Natural Science Foundation of China**)
- Precise Attitude and Orbit Determination of Low-cost Small LEO Satellites (HK\$250,000, 2023–2025, **University Grants Committee (UGC)-PolyU**)

### Co-Principal Investigator (Co-PI):

- Development of Onboard GNSS Positioning for Nanosatellites (HK\$1,200,000, 2024–2026, **The Hong Kong Polytechnic University Future Strategy Project**)
- High-precision undifferenced and uncombined (UDUC) GNSS model and its application in GNSS time and frequency transfer (CNY¥300,000, 2022-2023, **Open Fund of Hubei Luojia Laboratory, Wuhan University**)
- GNSS time transfer with optical clocks (CNY¥600,000, 2021–2023, **Interdisciplinary Collaborative Project, Chinese Academy of Sciences**)

### Co-Investigator (Co-I):

- Rapid Indoor 3D Modelling with Mobile Lidar System (HK\$615,000, 2024–2027, **Research Matching Grant Scheme, Research Grants Council of Hong Kong**)
- GNSS Kinematic Reference Stations with Chip Scale Atomic Clock Aiding for Offshore Real-Time Kinematic (RTK) Positioning (HK\$1,115,452, 2023-2025, **General Research Fund (GRF), Research Grants Council of Hong Kong**)

### Chief Investigator

- GNSS Tracking Formation-Flying of Nanosatellites Using Inter-Satellite Links (AUD\$406,000, 2020-2023, **Australian Research Council Discovery Scheme**)

- Collaborative Precision Positioning (CNY¥80,000,000, 2017-2022, **National Key Research Program of China**)

## Publications and Presentations

### Selected Journal Articles

1. Ding, J., Wu, C., Chen, J., Wang, J., Zhang, Y., Bai, L., Wang, Y., **Mi, X.**, Liu, T., & Weng, D. (2025) Spatiotemporal inhomogeneity of accuracy degradation in AI weather forecast foundation models: A GNSS perspective, **International Journal of Applied Earth Observation and Geoinformation**, 139, 104473.
2. Kong, Q., Huang, Y., **Mi, X.**, Bai, Q., Han, J., Chen, Y., & Wang, S. (2025). A new high-precision short-term ionospheric TEC prediction model based on the DBO-BiLSTM algorithm: A case study of Europe. **Advances in Space Research**.
3. Bai, Q., Kong, Q., **Mi, X.**, Chen, W., Ding, J., Huang, Y., Li, M., & Li, Q. (2025) Evaluation and analysis of the precipitable water vapor in Inner Mongolia of China, **Earth, Planets and Space**, 77, 24.
4. Luo, H., **Mi, X.**, Yang, Y., Chen, W., Weng, D. (2025) Multi-epoch grid-based 3DMA positioning in dense urban canyons with Optimizing LOS/NLOS modeling, **IEEE Transactions on Instrumentation and Measurement**, 74, 1-13.
5. Elsayed, H., El-Mowafy, A., Allahviridi-Zadeh, A., Wang, K., & **Mi, X.** (2025). A Combination of Classification Robust Adaptive Kalman Filter with PPP-RTK to Improve Fault Detection for Integrity Monitoring of Autonomous Vehicles. **Remote Sensing**, 17(2), 284.
6. Ding, J., **Mi, X.**, Wu, C., Chen, J., Wang, J., Zhang, Y., Awange, J., Soja, B., Bai, L., Deng, Y., & Tang, M. (2024) Forecasting of Tropospheric Delay Using AI Foundation Models in Support of Microwave Remote Sensing, **IEEE Transactions on Geoscience and Remote Sensing**, 62, 1-19.
7. Wang, J., **Mi, X.**, Chen, W., Weng, D., Luo, H., Mansour, A., Li, Y., & Yu, Y. (2024). Tightly Coupled Bluetooth Enhanced GNSS/PDR System for Pedestrian Navigation in Dense Urban Environments, **IEEE Transactions on Instrumentation and Measurement**, 73, 1-13.
8. Ding, M., Chen, W., Weng, D., & **Mi, X.** (2024). Adaptive Jamming Mitigation in Single Antenna Receivers with Spectral Analysis and Switchable Filtering, **IEEE Transactions on Aerospace and Electronic Systems**, 60(5), 5891-5905.

9. Ding, M., **Mi, X.**, Chen, W., Weng, D., & Ding, W. (2024). Equalization of frequency domain adaptive filter (FDAF) using signal prediction aided reference spectrum model (SPRSM), *IEEE Transactions on Instrumentation and Measurement*, 73, 1-16.
10. **Mi, X.**, Allahvirdir Zadeh, A., El-Mowafy, A., Huang Z., Wang, K., Zhang, B., & Yuan, Y. (2023). Absolute and relative POD of LEO satellites in formation flying: Undifferenced and uncombined approach, *Advances in Space Research*, 72(4), 1070-1080.
11. **Mi, X.**, Zhang, B., El-Mowafy, A., Wang, K., & Yuan, Y. (2023). Undifferenced and uncombined GNSS time and frequency transfer with integer ambiguity resolution. *Journal of Geodesy*, 97(2), 13.
12. **Mi, X.**, Zhang, B., El-Mowafy, A., Wang, K., & Yuan, Y. (2023). On the potential of GNSS time and frequency transfer with integer ambiguity resolution and satellite clocks estimated. *GPS Solutions*, 27(1), 25.
13. Wang, K., Sun, B., Qin, W., **Mi, X.**, El-Mowafy, A., & Yang, X. (2022). A method of real-time long-baseline time transfer based on the PPP-RTK. *Advances in Space Research*, 71(3), 1363-1376.
14. **Mi, X.**, Sheng, C., El-Mowafy, A., & Zhang, B. (2021). Characteristics of receiver-related biases between BDS-3 and BDS-2 for five frequencies including inter-system biases, differential code biases, and differential phase biases. *GPS Solutions*, 25(3), 113.
15. **Mi, X.**, Zhang, B., & Yuan, Y. (2021). Multi-GNSS RTK positioning with integer ambiguity resolution: From double-differenced to single-differenced. *Journal of Global Positioning Systems*, 17(2), 151-163.
16. **Mi, X.**, Yuan, Y., & Zhang, B. (2021). Characteristics of the short-term temporal variations of multi-constellation and multi-frequency GNSS receiver differential phase biases. *Acta Geodaetica et Cartographica Sinica*, 50(10), 1290.
17. **Mi, X.**, Zhang, B., Odolinski, R., & Yuan, Y. (2020). On the temperature sensitivity of multi-GNSS intra- and inter-system biases and the impact on RTK positioning. *GPS Solutions*, 24(4), 114.
18. Yuan, Y., **Mi, X.**, & Zhang, B. (2020). Initial assessment of single- and dual-frequency BDS-3 RTK positioning. *Satellite Navigation*, 1(1), 31.
19. **Mi, X.**, Zhang, B., & Yuan, Y. (2019). Multi-GNSS inter-system biases: estimability analysis and impact on RTK positioning. *GPS Solutions*, 23(3), 81.

20. **Mi, X.**, Zhang, B., Yuan, Y., & Luo, X. (2019). Characteristics of GPS, BDS2, BDS3 and Galileo inter-system biases and their influence on RTK positioning. ***Measurement Science and Technology***, 31(1), 015009.
21. **Mi, X.**, Zhang, B., & Yuan, Y. (2019). Stochastic modeling of between-receiver single-differenced ionospheric delays and its application to medium baseline RTK positioning. ***Measurement Science and Technology***, 30(9), 095008.

### Selected Conference Presentations

1. Liu, T., **Mi, X.**, Yang, Y., Weng, D., Chen, W. (2024) Model the Ionospheric Gradients Between Satellites in Network RTK. In: ***Proceedings of the 37th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2024)***, 16-20 September, Baltimore, USA.
2. Weng, D., Chen, W., **Mi, X.**, Liu, S. (2024) Accurate Pedestrian Positioning through Sidewalk Matching in Urban Canyons. In: ***Proceedings of the 37th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2024)***, 16-20 September, Baltimore, USA.
3. **Mi, X.**, El-Mowafy, A., Allahvirdizadeh, A., Wang, K. (2023) Undifferenced and uncombined GNSS approach for absolute and relative POD of LEO satellites in formation flying. In: ***European Geophysical Union (EGU) General Assembly 2023***, 23–28 April 2023, Vienna, Austria.
4. **Mi, X.**, El-Mowafy, A., Wang, K., Zhang, B., Liu T., Yuan Y. (2023) PPP time transfer independent of time-varying receiver biases. In: ***Proceedings of the 54th Annual Precise Time and Time Interval Systems and Applications Meeting***, 23-26 January 2023, Long Beach, USA.
5. **Mi, X.**, Allahvirdizadeh, A., El-Mowafy, A., Wang, K., Zhang, B. (2022). Undifferenced and uncombined GNSS approach with integer ambiguity resolution for absolute and relative POD of LEO satellites in formation flying. In: ***International Global Navigation Satellite Systems Conference (IGNSS) 2022***, 7-9 December 2022, Sydney, Australia.
6. **Mi, X.** (2021) Undifferenced and uncombined GNSS time transfer with integer ambiguity resolution. In: ***2021 National Academic Forum for Doctoral Students (Surveying and Mapping Science and Technology)***, 15-17 October 2021, Beijing, China.

7. **Mi, X.**, Zhang, B., Yunbin Yuan (2020). The short-term variation of receiver-related biases and its applications in RTK positioning. In: **International Association of Chinese Professionals in Global Navigation Satellite System Forum 2020**, 12-14 November 2020, Shanghai, China.

## Teaching Experience

**Coordinator of Survey Adjustment** (LSGI2341A), The Hong Kong Polytechnic University (2024–Present)

- Coordinated syllabus development and delivered lectures on least-square adjustment
- Taught programming languages (C++, MATLAB) for survey adjustment analysis

**Coordinator of Satellite Positioning Systems** (LSGI3322), The Hong Kong Polytechnic University (2024–Present)

- Coordinated syllabus development and delivered lectures on GNSS data processing.
- Supervised field surveys and GNSS data collection

**Contributor of Measurement and Adjustment Analysis** (SPAT3000), Curtin University (2022–2023)

- Conducted tutorials on survey adjustment techniques and provided feedback on assignments

**Contributor of Surveying Using Global Navigation Satellite Systems** (SPAT3004), Curtin University (2022–2023)

- Delivered lectures on the implementation of PPP and RTK techniques
- Supervised field surveys and GNSS data collection

## Research Supervision Duties

### Postdoctoral Fellow

1. Dr Huan Luo – High-precision GNSS positioning in complex urban environments (2023–Present)
2. Dr Junsheng Ding – GNSS Meteorology and AI for Geodesy (2023–Present)

3. Dr Tong Liu – GNSS ionospheric modelling and its application in space environments (2023-Present)
4. Dr Chao Yang – Precise orbit determination of LEO satellites (2024-Present)
5. Dr Jiahuan Hu – Real-time multi-GNSS PPP with ambiguity resolution (2025-Present)
6. Dr Duo Wang – AI for GNSS and Geodesy (2025-Present)

### PhD Student

1. Mr Yuanfan Deng – Real-time GNSS PPP with GNSS augmentation services (2023-Present)
2. Mr Weihao Ding – LEO-enhanced GNSS positioning and navigation (2023-Present)
3. Mr Xingyu Chen – PPP-RTK with high-precision atmospheric modeling (2024-Present)
4. Ms Yuyan Wang – Receiver clock modelling for GNSS PPP (2023-Present)
5. Mr Yang Wang – LEO PNT (2025-Present)

### Master Student

1. Mr Junhao Yang – LEO PNT (2025-Present)
2. Mr Wai Hung Chan – Multi-GNSS PPP for land surveying (Completed in 2024)

### Undergraduate Student

1. Mr Tong Cheuk Kuen – Robot Perception with Simultaneous Localization and Mapping (Completed in 2025)
2. Mr Kin Yeung Cheng – Characterization of ionospheric impact on GNSS PPP in low-latitude regions (Completed in 2025)

### Honors and Awards

- **Introduction to University Teaching**, The Hong Kong Polytechnic University (2024)
- **Excellence Prize of the President Award (Top 0.1%)**, Chinese Academy of Sciences (2022)
- **Zhu Li Yuehua Excellent Ph.D. Student Award (Top 0.1%)**, Chinese Academy of Sciences (2021)
- **National Scholarship for Ph.D. Students (Top 0.2%)**, the Ministry of Education of the People's Republic of China (2020)

- **Curtin International Postgraduate Research Scholarship (CIPRS)**, Curtin University (2020)
- **Excellent Paper Award (Top 1%)**, China Satellite Navigation and Positioning Association (2020)
- **IOP Outstanding Reviewer Awards (Top 1%)**, IOP Publishing (2019)

### Professional Associations

- **Working Group of GNSS time and frequency transfer**, International Union of Geodesy and Geophysics (IUGG), Germany (2023–Present)
- **Institute of Navigation (ION)**, USA (2023–Present)
- **American Geosciences Union (AGU)**, USA (2023–Present)
- **American Institute of Aeronautics and Astronautics (AIAA)**, USA (2023–Present)
- **European Geosciences Union (EGU)**, Germany (2023–Present)
- **Geospatial Council of Australia**, Australia (2023–Present)

### Volunteer Activities

**Journal Reviewer** (2019-Present): Served as a reviewer for over **20 top-tier journals** in **GNSS, space geodesy, remote sensing, and AI applications**. Notable journals include:

- *Journal of Geodesy*
- *GPS Solutions*
- *Satellite Navigation*
- *Remote Sensing of Environment*
- *IEEE Transactions on Geoscience and Remote Sensing*
- *IEEE Transactions on Intelligent Transportation Systems*
- *IEEE Transactions on Intelligent Vehicles*
- *Advances in Space Research*
- *International Journal of Applied Earth Observation and Geoinformation*
- *Measurement Science and Technology*

**GNSS Network Administration** (2017-2022): Managed a network of **13 GNSS receivers** at the **Institute of Geodesy and Geophysics, Chinese Academy of Sciences**:

*Curriculum Vitae: Dr. Xiaolong Mi*

- Supported research on GNSS constellation monitoring, PPP-RTK, RTK, and GNSS time transfer
- Ensured continuous data collection and quality control, enabling high-precision GNSS research

### **Skills and Abilities**

- **Programming:** Proficient in C, C++, MATLAB, and Fortran.
- **GNSS Tools:** Experienced in operating GNSS receivers, antennas, and software.
- **Operating Systems:** Skilled in Linux and Windows environments.
- **Leadership:** Effective team leader and project manager.