Mijian Xu, Ph.D of Seismology

gomijianxu@gmail.com
Homepage
Github
Google Scholar
ORCID

Employment History

July 2024 – Present	**Postdoctoral Research Fellow,** Department of Physics, University of Toronto, Canada Supervisor: *Qinya Liu*
Dec 2021 – Jun 2024	**Research Fellow,** School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore Supervisor: *Ping Tong*
Jun 2017 – July 2018	**Software Engineer,** Nanjing Site, CIeNET Technologies, China
July 2016 – May 2017	**Teaching Assistant,** School of Earth Science and Engineering, Nanjing University, China

Education

Sep 2018 – Jun 2021	**Ph.D., Nanjing University** in Geology. Thesis title: *Crustal Structure and Deformation in the Eastern Tibet: Insight From Seismic Images*.
Sep 2013 – Jun 2016	**M.Sc., Nanjing University** in Geophysics. Thesis title: *Mantle Transition Zone Structures Beneath SE Tibet Revealed by Receiver Functions*.
Sep 2009 – Jun 2013	**B.S., Nanjing University, Jinlin College** in Electronics.

Research Interests

- **Inverse problem in seismology**: Full-waveform inversion; Adjoint-stats traveltime tomography.
- **Seismic modeling and simulation:** Wave propagation in complex media; Traveltime modeling.
- **Artificial intelligence:** Neural network for PDE solver and seismic inversion.
- **Geophysical Survey**: Shallow subsurface structure imaging; Lithospheric imaging and dynamics.

Teaching Experience

Teaching Assistant

2016 – 2017	**Seismology** (15010030), undergrad course, Nanjing University
2016 – 2017, 2018 – 2020	**Geophysics Laboratory** (15010020), undergrad course, Nanjing University

Research Publications

∗ Corresponding Author

Journal Articles

1. Chen, Jing, **Mijian Xu**, Yiming Bai, Shucheng Wu, Xiao Xiao, Shijie Hao, Masaru Nagaso, Hongfeng Yang, and Ping Tong. "High normal stress promoted supershear rupture during the 2023 Mw 7.8 Kahramanmaraş earthquake". *Nature Geoscience*, Jan. 2026. https://doi.org/10.1038/s41561-025-01893-z.

2. Hao, Shijie, Jing Chen, **Mijian Xu**, Dayong Yu, Jingyun Xie, and Ping Tong. "Topography-Incorporated Adjoint-State Surface Wave Traveltime Tomography for Azimuthally Anisotropic Media". *Journal of Geophysical Research: Solid Earth*, vol. 131, no. 4, 2026, e2025JB033164. https://doi.org/10.1029/2025JB033164.

3. Chen, Jing, Masaru Nagaso, **Mijian Xu**, and Ping Tong. "TomoATT: An open-source package for Eikonal equation-based adjoint-state traveltime tomography for seismic velocity and azimuthal anisotropy". *Computers Geosciences*, vol. 204, June 2025, p. 105995. https://doi.org/10.1016/j.cageo.2025.105995.

4. Hu, Zhongfa, Yangfan Deng, Xiaofeng Liang, Zhou Zhang, **Mijian Xu**, and Xiaohui Yuan. "The Heterogeneous Mantle Transition Zone Beneath the Tarim Craton and Adjacent Region: Insight Into the Thermal Processes by the Cenozoic Reactivation". *Journal of Geophysical Research: Solid Earth*, vol. 130, no. 5, May 2025, e2024JB030831. https://doi.org/10.1029/2024JB030831.

5. Bai, Yiming, Shijie Hao, Jinyun Xie, **Mijian Xu**, Xiao Xiao, Jing Chen, Chun Fei Chey, Dongdong Wang, and Ping Tong. "Geothermal potential in Singapore explored with non-invasive seismic data". *Engineering Geology*, vol. 348, Feb. 2025, p. 107968. https://doi.org/10.1016/j.enggeo.2025.107968.

6. **Xu**, **Mijian**, Shijie Hao, Jing Chen, Bingfeng Zhang, and Ping Tong. "SurfATT: High-Performance Package for Adjoint-State Surface-Wave Travel-Time Tomography". *Seismological Research Letters*, vol. 96, no. 4, Jan. 2025, pp. 2638–46. https://doi.org/10.1785/0220240206.

7. **Xu**, **Mijian**, Kai Wang, Jing Chen, Jing He, Qinya Liu, Yiduo Liu, Zhouchuan Huang, and Ping Tong. "Multilevel Mechanisms Driving Intraplate Volcanism in Central Mongolia Revealed by Adjoint Waveform Tomography of Receiver Function and Ambient Noise Data". *Earth and Planetary Science Letters*, vol. 650, Jan. 2025, p. 119137. https://doi.org/10.1016/j.epsl.2024.119137.

8. Chen, Guoxu, Jing Chen, Tianjue Li, **Mijian Xu**, Qi Zhao, and Ping Tong. "Adjoint-State Reflection Traveltime Tomography for Velocity and Interface Inversion With Its Application in Central California Near Parkfield". *Journal of Geophysical Research: Solid Earth*, vol. 130, no. 1, 2025, e2024JB029918. https://doi.org/10.1029/2024JB029918.

9. Han, Cunrui, James O.S. Hammond, Maxim D. Ballmer, Wei Wei, **Mijian Xu**, Zhouchuan Huang, and Liangshu Wang. "Multi-scale anisotropy in NE China: Evidence for localized mantle upwelling". *Earth and Planetary Science Letters*, vol. 625, 2024, p. 118495. https://doi.org/10.1016/j.epsl.2023.118495.

10. Hao, Shijie, Jing Chen, **Mijian Xu**, and Ping Tong. "Topography-Incorporated Adjoint-State Surface Wave Traveltime Tomography: Method and a Case Study in Hawaii". *Journal of Geophysical Research: Solid Earth*, vol. 129, no. 1, 2024, e2023JB027454. https://doi.org/10.1029/2023JB027454.

11. Chen, Jing, Shucheng Wu, **Mijian Xu**, Masaru Nagaso, Jiayuan Yao, Kai Wang, Tianjue Li, Yiming Bai, and Ping Tong. "Adjoint-State Teleseismic Traveltime Tomography: Method and Application to Thailand in Indochina Peninsula". *Journal of Geophysical Research: Solid Earth*, vol. 128, no. 12, 2023, e2023JB027348. https://doi.org/10.1029/2023JB027348.

12. **Xu**, **Mijian**, Kai Wang, Jing Chen, Dayong Yu, and Ping Tong. "Receiver Function Adjoint Tomography for Three-Dimensional High-Resolution Seismic Array Imaging: Methodology and Applications in Southeastern Tibet". *Geophysical Research Letters*, vol. 50, no. 19, 2023, e2023GL104077. https://doi.org/10.1029/2023GL104077.

13. **Xu**, **Mijian**, and Jing He. "Seispy: Python Module for Batch Calculation and Postprocessing of Receiver Functions". *Seismological Research Letters*, vol. 94, 2A, Dec. 2022, pp. 935–43. https://doi.org/10.1785/0220220288.

14. He, Jing, **Mijian Xu***, Qingju Wu, and Fengxue Zhang. "Hydrous Melting Driven Upwelling From the Mantle Transition Zone in the Mongolia Plateau Revealed by Receiver Function Analysis". *Journal of Geophysical Research: Solid Earth*, vol. 127, no. 11, 2022, e2022JB024905. https://doi.org/10.1029/2022JB024905.

15 Hu, Xuzhi, **Mijian Xu***, Mingjie Xu, Yueqiao Zhang, and Zhouchuan Huang. "A relic thickened crustal root beneath the Cenozoic rift zone of the NW Ordos margin, North China, revealed by receiver functions". *Physics of the Earth and Planetary Interiors*, vol. 333, 2022, p. 106953. https://doi.org/10.1016/j.pepi.2022.106953.

16 Li, Tianjue, Jiayuan Yao, Shucheng Wu, **Mijian Xu**, and Ping Tong. "Moho Complexity in Southern California Revealed by Local PmP and Teleseismic Ps Waves". *Journal of Geophysical Research: Solid Earth*, vol. 127, no. 2, 2022, e2021JB023033. https://doi.org/10.1029/2021JB023033.

17 **Xu**, **Mijian**, Dayong Yu, Zhouchuan Huang, Ping Tong, Shijie Hao, Youyi Ruan, and Cunrui Han. "Crustal and Uppermost Mantle Heterogeneities Across the Ailaoshan Red River Shear Zone, SE Tibet: Implications for Cenozoic Magmatic Activity". *Journal of Geophysical Research: Solid Earth*, vol. 127, no. 6, 2022, e2021JB023656. https://doi.org/10.1029/2021JB023656.

18 **Xu**, **Mijian**, Zhouchuan Huang, Liangshu Wang, Mingjie Xu, Yueqiao Zhang, Ning Mi, Dayong Yu, and Xiaohui Yuan. "Sharp Lateral Moho Variations Across the SE Tibetan Margin and Their Implications for Plateau Growth". *Journal of Geophysical Research: Solid Earth*, vol. 125, no. 5, May 2020. https://doi.org/10.1029/2019JB018117.

19 Tian, Muyu, Zhouchuan Huang, Liangshu Wang, Mingjie Xu, Ning Mi, Dayong Yu, Haibo Wang, Tao Gou, **Mijian Xu**, Cunri Han, Shijie Hao, and Yajing Bi. "Tectonic evolution of the eastern margin of the Tibetan plateau: Insight from crustal structures using P wave receiver functions". *Journal of Asian Earth Sciences*, vol. 191, Apr. 2020, p. 104230. https://doi.org/10.1016/j.jseaes.2020.104230.

20 **Xu**, **Mijian**, Zhouchuan Huang, Liangshu Wang, Mingjie Xu, Ning Mi, and Dayong Yu. "Lateral variation of the mantle transition zone beneath the Tibetan Plateau: Insight into thermal processes during Indian–Asian collision". *Physics of the Earth and Planetary Interiors*, vol. 301, Apr. 2020, p. 106452. https://doi.org/10.1016/j.pepi.2020.106452.

21 Han, Cunrui, **Mijian Xu**, Zhouchuan Huang, Liangshu Wang, Mingjie Xu, Ning Mi, Dayong Yu, Tao Gou, Haibo Wang, Shijie Hao, Muyu Tian, and Yajing Bi. "Layered crustal anisotropy and deformation in the SE Tibetan plateau revealed by Markov-Chain-Monte-Carlo inversion of receiver functions". *Physics of the Earth and Planetary Interiors*, 2020, p. 106522. https://doi.org/10.1016/j.pepi.2020.106522.

22 **Xu**, **Mijian**, Hui Huang, Zhouchuan Huang, Pan Wang, Liangshu Wang, Mingjie Xu, Ning Mi, Hua Li, Dayong Yu, and Xiaohui Yuan. "Insight into the subducted Indian slab and origin of the Tengchong volcano in SE Tibet from receiver function analysis". *Earth and Planetary Science Letters*, 2018. https://doi.org/10.1016/j.epsl.2017.11.048.

23 **Xu**, **Mijian**, Hui Huang, Zhouchuan Huang, and Liangshu Wang. "SplitRFLab: A MATLAB GUI toolbox for receiver function analysis based on SplitLab". *Earthquake Science*, 2016. https://doi.org/10.1007/s11589-016-0141-8.

24 Huang, Zhouchuan, Pan Wang, Mingjie Xu, Liangshu Wang, Zhifeng Ding, Yan Wu, **Mijian Xu**, Ning Mi, Dayong Yu, and Hua Li. "Mantle structure and dynamics beneath SE Tibet revealed by new seismic images". *Earth and Planetary Science Letters*, vol. 411, 2015, pp. 100–111. https://doi.org/10.1016/j.epsl.2014.11.040.

Skills

Languages	Mandarin Chinese, English.
Coding	Python, Modern Fortran, C/C++, MPI, CUDA, PyTorch, …
Seismological Software	Specfem3D (Cartesian and Global versions), SAC, Obspy, GMT, …
Instruments	Reftek-130/130s data logger, Guralp CMG-40T/3T sensor, Zland 3C nodes, …

Skills (continued)

Misc. High-performance computing, RedHat operation and maintenance, Continuous Integration, …

Miscellaneous Experience

Software

2025 – present **SpecFWAT** (Maintainer) – A full-waveform adjoint tomography package based on SPECFEM3D, (*Modern Fortran, MPI, CUDA*).
The SpecFWAT package can conduct full-waveform adjoint tomography of noise, teleseismic, receiver function data, and their joint inversion for lithospheric structures.
https://specfwat.xumijian.me

2024 – present **RefATT** (Maintainer) – A high-performance package for refraction and reflection traveltime tomography based on adjoint-state method, (*C++, MPI, OpenMP*).
https://refatt.xumijian.me, Contact Prof. Ping Tong for license.

2023 – present **SurfATT** (Maintainer) A Package for adjoint-state surface wave traveltime tomography, (*Modern Fortran, MPI*).
https://tomoatt.com/surfatt/index.html

TomoATT & **PyTomoATT** (Developer) Scalable library for Eikonal equation-based Adjoint-state Traveltime Tomography, (*C++, MPI, Python*).
https://tomoatt.com

2016 – present **Seispy** (Maintainer) – A Python module for automatic calculations of receiver function and its derivative process (*Python*).
https://seispy.xumijian.me

2014 **SplitRFLab** (Maintainer) – A Matlab toolbox for computing receiver functions and shear wave splitting, (*Matlab*).
https://github.com/xumi1993/SplitRFLab

Certification

2016 **Red Hat Certified Engineer** (PDF link)

Field Experience

2023 **Geothermal survey in Singapore**, Install and maintain 80 short period nodes in Sembawang, Singapore.

2019 **Geological survey in Huizhou**, Install 500 short period nodes and 25 broadband seismic stations across Lianhuashan Fault zone.

2018 – 2020 **ChinArray III**, Install and maintain broadband seismic stations in Liaodong Peninsula.

2013 – 2016 **ChinArray II**, Install and maintain broadband seismic stations in Ordos Basin.

Peer Review

- Journal of Geophysical Research: Solid Earth (2)
- Tectonophysics (5)
- Earth and Space Science(2)

Miscellaneous Experience (continued)

- Seismological Research Letters (1).