

WU-YU LIAO, Ph.D.

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PROFESSIONAL SUMMARY

Postdoctoral researcher in seismology and AI for Earth sciences with expertise in deep-learning-based seismic monitoring, earthquake detection and phase picking, seismic source characterization, and large-scale waveform processing. Published 14 peer-reviewed papers, including 5 first-author publications, and developed practical machine learning systems for earthquake early warning, autonomous seismic networks, rockfall detection, and big-data seismic catalog construction.

RESEARCH INTERESTS

Seismology; Tectonophysics; Deep Learning; AI for Earth Sciences; Earthquake Early Warning; Seismic Signal Processing; Earthquake Source Characterization; Seismic Monitoring of Slope Failure

TECHNICAL SKILLS

Programming: Python, Bash, MATLAB

Machine Learning: PyTorch, TensorFlow, Keras, Scikit-learn, multitask learning, transfer learning, deep neural networks

Seismology Tools: ObsPy, SAC, GMT, PyGMT, HypoDD, GrowClust

Scientific Computing: NumPy, Pandas, Matplotlib, Cartopy, Jupyter

HPC and GPU Computing: Taiwan Computing Cloud (TWCC), multi-GPU distributed training, GPU-accelerated seismic monitoring

Data Systems: Large-scale seismic catalog building, automatic waveform processing pipelines, deep-learning-driven seismic monitoring, Git/GitHub

PROFESSIONAL EXPERIENCE

Incoming Postdoctoral Researcher

Institute of Earth Sciences, Academia Sinica | Taipei, Taiwan | Starting 2026-08-01

- Will conduct postdoctoral research in Earth sciences with emphasis on seismology, earthquake source processes, and data-driven seismic monitoring.
- Will apply deep learning, large-scale seismic data processing, and high-performance computing methods to earthquake monitoring and source characterization.

Postdoctoral Researcher

Department of Earth Sciences, National Cheng Kung University | Tainan, Taiwan | 2024-Present

- Develop deep-learning-based workflows for earthquake detection, phase picking, source characterization, and seismic catalog construction.
- Build practical seismic monitoring systems that combine physics-based methods with machine learning models for continuous waveform analysis.
- Conduct research on earthquake sequences, seismogenic structures, and seismic source monitoring using dense seismic observations.
- Publish peer-reviewed research in seismology, tectonophysics, earthquake early warning, and AI-enabled Earth science applications.

Visiting Researcher, Internship

GNS Science | Lower Hutt, New Zealand | 2023

- Conducted collaborative research on seismic monitoring and machine learning applications in Earth sciences.
- Applied waveform analysis and deep learning methods to seismic detection and characterization problems.

Research Assistant

Department of Earth Sciences, National Cheng Kung University | Tainan, Taiwan | 2019-2020

- Supported seismic waveform processing, earthquake monitoring, and computational seismology research projects.
- Developed and maintained data processing workflows for seismic phase identification and earthquake analysis.

EDUCATION

Ph.D. in Earth Sciences | National Cheng Kung University | Tainan, Taiwan | 2020-2024

Dissertation: Assimilation of deep-learning based and physics-based seismic sources monitoring: from model setup to practical deployment

Advisor: Prof. En-Jui Lee

M.S. in Earth Sciences | National Cheng Kung University | Tainan, Taiwan | 2017-2019

Thesis: Using deep learning for the seismic phase identification and its potential applications

Advisor: Prof. En-Jui Lee

B.S. in Earth Sciences | National Cheng Kung University | Tainan, Taiwan | 2013-2017

SELECTED RESEARCH CONTRIBUTIONS

- Developed RED-PAN, a real-time earthquake detection and phase-picking model using a multitask attention network.
- Developed ARRU Phase Picker, an attention recurrent-residual U-Net model for seismic P- and S-phase arrival picking.
- Developed RockNet, a multitask and transfer learning system for rockfall and earthquake detection and association.
- Built deep-learning-assisted seismic monitoring workflows for continuous recordings and autonomous seismic network applications.
- Contributed to GPU-accelerated automatic microseismic monitoring and dense-array earthquake early warning research.

PUBLICATIONS

14 peer-reviewed publications, including 5 first-author papers.

Selected first-author publications:

- Liao, W.-Y., Lee, E.-J., Rau, R.-J. et al. (2025). Fast report: seismogenic structure of the 2025 M6.4 Dapu earthquake sequence in western Taiwan revealed by a deep-learning-empowered earthquake catalog. *Terrestrial, Atmospheric and Oceanic Sciences*, 36, 10.
- Liao, W.-Y., Lee, E.-J., Wang, C.-C., Chen, P., Provost, F., Hibert, C., Malet, J.-P., Chu, C.-R., and Lin, G.-W. (2023). RockNet: Rockfall and Earthquake Detection and Association via Multitask Learning and Transfer Learning. *IEEE Transactions on Geoscience and Remote Sensing*, 61, 1-12.
- Liao, W.-Y., Lee, E.-J., Chen, D.-Y., Chen, P., Mu, D., and Wu, Y.-M. (2022). RED-PAN: Real-Time Earthquake Detection and Phase-Picking With Multitask Attention Network. *IEEE Transactions on Geoscience and Remote Sensing*, 60, 1-11.
- Liao, W.-Y., Lee, E.-J., Mu, D., and Chen, P. (2022). Toward Fully Autonomous Seismic Networks: Backprojecting Deep Learning-Based Phase Time Functions for Earthquake Monitoring on Continuous Recordings. *Seismological Research Letters*.
- Liao, W.-Y., Lee, E.-J., Mu, D., Chen, P., and Rau, R.-J. (2021). ARRU Phase Picker: Attention Recurrent-Residual U-Net for Picking Seismic P- and S-Phase Arrivals. *Seismological Research Letters*.

HONORS AND AWARDS

- Outstanding Award, Grand Review Doctoral Student Academic Competition, National Cheng Kung University, 2022
- Prof. Yi-Ben Tsai Graduate Student Scholarship, Geophysical Society of Taiwan, 2022
- Aerospace Research Award, National Cheng Kung University College of Science Research Exhibition, 2022
- 2nd Place, 3rd NCKU Earth Sciences Student Research Forum, Ph.D. Division, 2022
- Excellence Award, Grand Review Doctoral Student Academic Competition, National Cheng Kung University, 2021
- Honorable Mention, National Cheng Kung University College of Science Research Day, 2021

- Juan Wei-Zhou Thesis Award, 2021
- 1st Place, 2nd NCKU Earth Sciences Student Research Forum, Ph.D. Division, 2021
- Merit Award, Student Paper Competition, Geophysical Society and Geological Society of Taiwan, 2020
- 1st Place, 1st NCKU Earth Sciences Student Research Forum, Ph.D. Division, 2020

ADDITIONAL ACHIEVEMENTS

- Selected by Taiwan's National Center for High-Performance Computing in the Taiwan Computing Cloud Star Startup Competition as a distinguished innovation project for ARRU Seismic Phase Picker, 2020.
- 3rd Place, AI CUP Competition on Medical Dialogue Decision: De-identification Task, Ministry of Education, Taiwan, 2020.

PEER REVIEW SERVICE

Reviewer for Bulletin of the Seismological Society of America, Seismological Research Letters, Journal of Geophysical Research, IEEE Geoscience and Remote Sensing Letters, IEEE Access, Scientific Reports, and Frontiers in Earth Sciences.