Yuan Yuan

NYU Courant
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EDUCATION

2020-2025 **Ph.D.**
Department of Electronic Engineering, Tsinghua University
Advisors: Prof. Yong Li and Prof. Depeng Jin
Dissertation: "Research on Key Technologies of Spatio-Temporal Foundation Models", Outstanding Doctoral Dissertation Award

2016-2020 **B.Eng./B.S.**
Department of Electronic Engineering, Tsinghua University

EMPLOYMENT

2025 – present Postdoctoral Researcher, Courant Institute of Mathematical Sciences, New York University; Advisors: Prof. Laure Zanna, Prof. Carlos Fernandez-Granda, and Prof. Joan Bruna

2019.6 – 2019.8 Research Assistant, Knowledge Lab, The University of Chicago; Supervisor: Prof. James Evans

RESEARCH INTEREST

I am interested in building foundation models and neural emulators for weather and climate ocean systems, with the goal of accelerating Earth system simulation and enabling scalable scientific discovery. My recent work focuses on long-horizon climate emulation, spatio-temporal representation learning, and physically meaningful evaluation of AI-based climate models.

RESEARCH PAPERS

Author contributions: * equal contribution; † corresponding author.

1. **Yuan Yuan**, Jingtao Ding, Zhongpu Qiu, Jingfang Fan, and Yong Li (2026). "Learning the coupled dynamics of global climate modes". *Nature Machine Intelligence*.
2. **Yuan Yuan**, Jesse Rusak, Alexander Merose, Adam Subel, Pavel Perezhogin, Alistair Adcroft, Carlos Fernandez-Granda, and Laure Zanna (2026). "Samudra 2: Scaling Ocean Emulators across Resolutions". Project webpage: https://openathena.ai/Ocean_Emulator/.
3. **Yuan Yuan**, Chonghua Han, Jingtao Ding, Guozhen Zhang, Depeng Jin, and Yong Li (2025). "Diffusion Transformers as Open-World Spatiotemporal Foundation Models". *The Thirty-ninth Annual Conference on Neural Information Processing Systems*.
4. Jingtao Ding*, **Yuan Yuan***, Zihan Yu*, Yunke Zhang, En Xu, Sibo Li, Chang Liu, and Yong Li (2026). "Towards an AI Earth System Scientist: Autonomous Scientific Discovery and Accelerated Transformations Towards Global Sustainability".

5. Zhi Sheng**, Yuan Yuan**†, Yudi Zhang, Depeng Jin, and Yong Li (2026). "Collaborative Deterministic-Probabilistic Learning for Real-World Spatiotemporal Dynamics". *32nd SIGKDD Conference on Knowledge Discovery and Data Mining*.

6. Wanjin Feng**, Yuan Yuan**†, Jingtao Ding, and Yong Li (2026). "Beyond Model Ranking: Predictability-Aligned Evaluation for Time Series Forecasting". *Forty-Third International Conference on Machine Learning*.

7. Ruikun Li, Huandong Wang, Jingtao Ding**, Yuan Yuan**, Qingmin Liao, and Yong Li (2026). "Predicting Dynamical Systems across Environments via Diffusive Model Weight Generation". *Forty-Third International Conference on Machine Learning*.

8. **Yuan Yuan***, Yuheng Zhang*, Jingtao Ding, and Yong Li (2026). "WorldMove, a global open data for human mobility". *Scientific Data* 13. https://doi.org/10.1038/s41597-026-06555-2.

9. **Yuan Yuan**, Jingtao Ding, Chonghua Han, Zhi Sheng, Depeng Jin, and Yong Li (2026). "UniFlow: A Foundation Model for Unified Urban Spatio-Temporal Flow Prediction". *IEEE Transactions on Mobile Computing*.

10. **Yuan Yuan**, Jingtao Ding, Depeng Jin, and Yong Li (2025). "Learning the complexity of urban mobility with deep generative network". *PNAS Nexus* 4.5, pgaf081. https://doi.org/10.1093/pnasnexus/pgaf081.

11. **Yuan Yuan**, Jingtao Ding, Jie Feng, Depeng Jin, and Yong Li (2025). "A Universal Pre-Training and Prompting Framework for General Urban Spatio-Temporal Prediction". *IEEE Transactions on Knowledge and Data Engineering* 37.5, pp. 2212–2225. https://doi.org/10.1109/TKDE.2025.3545948.

12. Yuheng Zhang*, **Yuan Yuan***, Jingtao Ding, Jian Yuan, and Yong Li (2025). "Noise Matters: Diffusion Model-based Urban Mobility Generation with Collaborative Noise Priors". *Proceedings of the ACM Web Conference 2025*. WWW '25, pp. 5352–5363. https://doi.org/10.1145/3696410.3714516.

13. Zhi Sheng*, **Yuan Yuan***, Jingtao Ding, Qi Yan, Xi Zheng, Yue Sun, and Yong Li (2025). "Unveiling the Power of Noise Priors: Enhancing Diffusion Models for Mobile Traffic Prediction". *Proceedings of the Thirty-Fourth International Joint Conference on Artificial Intelligence, IJCAI-25*. Main Track, pp. 3263–3271. https://doi.org/10.24963/ijcai.2025/363.

14. Huandong Wang, Huan Yan, Can Rong**, Yuan Yuan**, Fenyu Jiang, Zhenyu Han, Hongjie Sui, Depeng Jin, and Yong Li (2024). "Multi-scale Simulation of Complex Systems: A Perspective of Integrating Knowledge and Data". *ACM Computing Surveys* 56.12, pp. 1–38.

15. **Yuan Yuan**, Jingtao Ding, Jie Feng, Depeng Jin, and Yong Li (2024). "UniST: A Prompt-Empowered Universal Model for Urban Spatio-Temporal Prediction". *Proceedings of the 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*. KDD '24, pp. 4095–4106. https://doi.org/10.1145/3637528.3671662.

16. **Yuan Yuan***, Chenyang Shao*, Jingtao Ding, Depeng Jin, and Yong Li (2024). "Spatio-Temporal Few-Shot Learning via Diffusive Neural Network Generation". *The Twelfth International Conference on Learning Representations*.

17. **Yuan Yuan**, Jingtao Ding, Chenyang Shao, Depeng Jin, and Yong Li (2023). "Spatio-Temporal Diffusion Point Processes". *Proceedings of the 29th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*. KDD '23, pp. 3173–3184. https://doi.org/10.1145/3580305.3599511.

18. **Yuan Yuan**, Huandong Wang, Jingtao Ding, Depeng Jin, and Yong Li (2023). "Learning to Simulate Daily Activities via Modeling Dynamic Human Needs". *Proceedings of the ACM Web Conference 2023*. WWW '23, pp. 906–916. https://doi.org/10.1145/3543507.3583276.

19. **Yuan Yuan**, Jingtao Ding, Huandong Wang, Depeng Jin, and Yong Li (2022). "Activity Trajectory Generation via Modeling Spatiotemporal Dynamics". *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining*. KDD '22, pp. 4752–4762. https://doi.org/10.1145/3534678.3542671.

TEACHING

Spring 2023, Spring 2024	Teaching Assistant, *Mobile Data Mining*, Tsinghua University
Spring 2025	Guest Lecturer, *Mobile Data Mining*, Tsinghua University
Fall 2024	Guest Lecturer, *Artificial Intelligence*, Tsinghua University
Fall 2022, Fall 2023	Teaching Assistant, *Database Systems*, Tsinghua University

AWARDS & HONORS

2025	Tsinghua University Outstanding Doctoral Dissertation Award
2025	Tsinghua University Outstanding Ph.D. Graduate
2024	KDD 2024 Student Travel Award
2021, 2023, 2024	Comprehensive Excellence Award, Tsinghua University
2017, 2018, 2019	Academic Excellence Scholarship, Tsinghua University

PRESENTATIONS

Invited presentations:

Nov. 2025	"Spatiotemporal Foundation Models for Earth Science." Invited forum talk, *Bulletin of Geological Science and Technology*.
Oct. 2025	"Unified Modeling of Spatiotemporal Sequences Across Cities, Scenarios, and Tasks." Invited forum talk, CNCC 2025, Harbin, China.
Oct. 2025	"Spatiotemporal Foundation Models for Earth Science." Invited forum talk, The Second National Symposium on Data-Driven Geography Development, Zhuhai, China.
Mar. 2024	"Towards One-for-All Solutions in Urban Spatio-temporal Modeling." Invited seminar, Hong Kong University of Science and Technology.
Nov. 2024	"Urban Spatiotemporal Foundation Models." Guest lecture, *Artificial Intelligence*, Tsinghua University.

Selected conference presentations:

2024	Oral Presentation, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2024).
2023	Oral Presentation, ACM Web Conference (WWW 2023).
2023	Oral Presentation, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2023).

PROFESSIONAL SERVICE

Conference Reviewing:
International Conference on Learning Representations (ICLR), 2024-present.

Conference on Neural Information Processing Systems (NeurIPS), 2024-present.

International Conference on Machine Learning (ICML), 2024-present.

ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2023-present.

ACM Web Conference (WWW), 2024-present.

Journal Reviewing:
Nature Human Behavior.

IEEE Transactions on Knowledge and Data Engineering (TKDE).

IEEE Transactions on Neural Networks and Learning Systems (TNNLS).

Neurocomputing.

Scientific Data.

Scientific Reports.

SKILLS

Programming: Python, C/C++, PyTorch.

LLM & Agent Tooling: Claude Code, Codex, LLM-based agent workflows, and prompt engineering for scientific reasoning.

Infrastructure: Large-scale distributed training, multi-GPU/multi-node computing, Spark, Git/GitHub, Linux, HPC/Slurm.

Languages: English, Chinese.