Zhongrui Wang

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EDUCATION

University of Wisconsin-Madison — Madison, WI
Ph.D. - Mathematics — *Jul 2023 - present*
Advisor: Prof. Nan Chen

Nanjing University — Nanjing, China
M.S. - Atmospheric Science — *Sep 2020 - Jun 2023*
Advisor: Prof. Lili Lei

Nanjing University — Nanjing, China
B.S. - Atmospheric Science — *Sep 2016 - Jun 2020*

RESEARCH EXPERIENCE

Research Assistant — University of Wisconsin-Madison
Nonlinear data assimilation methods for multi-layer flow fields — *Feb 2024 - present*
Unified digital twins framework for stochastic modeling, forecast, and data assimilation

Research Assistant — Nanjing University
Machine learning localization methods for ensemble-based data assimilation — *Sep 2021 - Sep 2023*
Hybrid ensemble–variational assimilation methods

Undergraduate Research Assistant — Nanjing University
Evaluating large-eddy simulation of traffic-related air pollution with mobile sensors — *Jul 2019 - Sep 2019*

PUBLICATIONS

- Chuanqi, C., **Wang, Z.**, Nan, C., and Jinlong, W. "Learning Surrogate Models and Efficient Data Assimilation via Discrete-Time Conditional Gaussian Koopman Network", *paper submitted to Computer Methods in Applied Mechanics and Engineering*, 2025

- **Wang, Z.**, Nan, C., and Di, Q. "A Closed-Form Nonlinear Data Assimilation Algorithm for Multi-Layer Flow Fields", *paper submitted to Monthly Weather Review*, 2024

- **Wang, Z.**, Lei, L., Anderson, J. L., Tan, Z., and Zhang, Y. "CNN-based adaptive localization for an ensemble Kalman filter", *Journal of Advances in Modeling Earth Systems*, 2023

- **Wang, Z.**, Sun, H., Lei, L., and Tan, Z. "The importance of data assimilation components for initial conditions and subsequent error growth", *Science China Earth Sciences*, 2023

- Lei, L., **Wang, Z.**, and Tan, Z. "Integrated Hybrid Data Assimilation for an Ensemble Kalman Filter", *Monthly Weather Review* 149, 12, 4091-4105, 2021.

- Wang, S., Ma, Y., **Wang, Z.**, Wang, L., Chi, X., Ding, A., Yao, M., Li, Y., Li, Q., Wu, M., Zhang, L., Xiao, Y., and Zhang, Y. "Mobile monitoring of urban air quality at high spatial resolution by low-cost sensors: impacts of COVID-19 pandemic lockdown", *Atmospheric Chemistry and Physics* 21, 7199–7215, 2021.

- Zhang, Y., Ye, X., Wang, S., He, X., Dong, L., Zhang, N., Wang, H., **Wang, Z.**, Ma, Y., Wang, L., Chi, X., Ding, A., Yao, M., Li, Y., Li, Q., Zhang, L., and Xiao, Y. "Large-eddy simulation of traffic-related air pollution at a very high resolution in a mega-city: evaluation against mobile sensors and insights for influencing factors", *Atmospheric Chemistry and Physics* 21, 2917–2929, 2021.

CONFERENCES

- SIAM Conference on Applications of Dynamical Systems on nonlinear and stochastic dynamics in weather and climate science, Denver, USA, 2025 (invited talk, upcoming)

- The Institute for Foundations of Data Science (IFDS) ideas forum, Madison, USA, 2025 (invited talk)

- The American Geophysical Union (AGU) Annual Meeting, Washington, D.C., USA 2024 (poster)

- 102nd American Meteorological Society (AMS) Annual Meeting, 26th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), 2022 (talk)

TEACHING

Teaching Assistant — Nanjing University
Course: Dynamic Meteorology — *Fall 2021*

University of Wisconsin-Madison
Course: Math 114 — *Fall 2023*

PROGRAMMING

Python(numpy, scipy, Tensorflow, Pytorch)/MATLAB/linux/C/fortran