XIN HUANG

Center for Ecosystem Science and Society (ECOSS), Northern Arizona University, Flagstaff, AZ 86004
xh59@nau.edu (+1)928-266-9242 https://celestehuang.cn

RESEARCH INTEREST

Uncertainty Quantification	Sensitivity Analysis	Ecological Predication
Data Assimilation	Machine Learning	High Performance Computing

EDUCATION

Northern Arizona University (Flagstaff, USA) *Aug. 2018 - Dec. 2022*
Ph.D., School of Informatics, Computing and Cyber Systems
Advisors: Dr. Yiqi Luo and Dr. Michael Gowanlock

Tsinghua University (Beijing, China) *Aug. 2014 - July. 2018*
M.Sc., Department of Computer Science and Technology
Advisors: Dr. Weimin Zheng and Dr. Wei Xue

University of Electronic Science and Technology (Chengdu, China) *Aug. 2011 - July. 2014*
B.Sc., School of Software Engineering GPA: **3.86/4.0** (Rank: **1/190**)

RESEARCH EXPERIENCE

Center for Ecosystem Science and Society, Northern Arizona University *Aug. 2018 - present*
Research Assistant

- Conducted predictability analysis to investigate the relative contributions of different uncertainty sources to the predicted carbon cycle in a peatland ecosystem under global warming and elevated CO2 concentration treatments.
- Performed data assimilation study in a permafrost ecosystem under manipulative warming. Concluded that carbon emission is underestimated due to changes in water cycle process after permafrost thaw.
- Designed and developed a non-intrusive data assimilation module (MIDA), which facilitated data-worth analysis and model comparison for ecologists lacking programming skills.
- Employed Deep Learning techniques (LSTM, convLSTM, convGRU) to make monthly drought predictions in US.
- Developed a web-based ecological prediction system (EcoPAD) to support seamless data assimilation and weekly predictions.

High Performance Computing Institute, Tsinghua University *Sept. 2014 - July 2018*
Research Assistant

- Developed a climate prediction system based on the Beijing Climate Center Climate System Model (BCC-CSM), including sensitivity analysis, parameter optimization and ensemble prediction.
- Devised a parameterization and a diagnostic scheme for a Single Column Atmospheric Model (SCAM).
- Designed a Dynamic Sensitivity Analysis Method (DSAM) to screen out the influential parameters in earth system models to reduce computation cost in parameter optimization. DSAM improved the accuracy of parameter screening by 50% compared to traditional sensitivity analysis methods.
- Conducted uncertainty analysis with a Grid-point Atmospheric Model of IAP LASG version 2 (GMAIL2), including sensitivity analysis, parameter optimization and surrogate modeling.
- Managed and maintained a cluster with 16 computing nodes in our lab.
- Participated in the development of supercomputers Sunway TaihuLight (ranked sixth in the TOP500 list) and Tianhe-2 (ranked nineth in the TOP500 list).

TEACHING

BIO 599: Data-Model Fusion in Ecology, Northern Arizona University, *Teaching Assistant* *Spring 2019*
Training Course on New Advances in Land Carbon Cycle Modeling, *Lecturer* *2018 - 2021*

PUBLICATIONS

Book chapter

- Land Carbon Cycle Modeling: Matrix Approach, Data Assimilation, and Ecological Forecasting, 2022 June, CRC Press, 352-163.

Journals and presentations

- **X. Huang**, X. Lu, B. Izbicki, E. Pegoraro, L. Jiang, T. Schuur, Y. Luo, Elevated water table depth turns carbon sink to source under 8-year permafrost warming experiment, *(in prep)*, 2022.
- C. Liao, W. Huang, J. Wells, R. Zhao, K. Allen, E. Hou, **X. Huang**, H. Qiu, M. Aguilos, L. Lin, L. Jiang, F. Tao, S. Hall, Y. Luo. Microbe-iron interactions control lignin decomposition, *Soil Biology and Biochemistry (in review)*, 2022.
- **X. Huang**, D. Lu, D. Ricciuto, P. Hanson, A. Richardson, X. Lu, E. Weng, S. Nie, L. Jiang, E. Hou, I. Steinmacher, Y. Luo. A model-independent data assimilation (MIDA) module and its applications in ecology. *Geoscientific Model Development*, 2021, 14(8): 5217-5238.
- Z. Li, Z. Zeng, Z. Song, F. Wang, D. Tian, W. Mi, **X. Huang**, J. Wang, L. Song, Z. Yang, J. Wang, H. Feng, L. Jiang, Y. Chen, Y. Luo, S. Niu. Vital roles of soil microbes in driving terrestrial nitrogen immobilization. *Global Change Biology*, 2021, 27(9): 1848-1858.
- **X. Huang**, D. Lu, D. Ricciuto, X. Lu, E. Weng, S. Nie, I. Steinmacher, A. Richardson, P. Hanson, Y. Luo. A software system to facilitate Model- Independent Data Assimilation and ecological forecasting. *AGU Fall Meeting*, 2020, poster.
- **X. Huang**, Q. Li, Y. Luo, W. Xue. An improved parameter screening method based on sensitivity analysis. *Application of Electronic Technique (Chinese)* 2018(12).27.
- H. Xu, T. Zhang, Y. Luo, W. Xue, **X. Huang**. Parameter Calibration in Global Land Carbon Models Using Surrogate and Global Optimization. *Geoscientific Model Development*, 2018, 11: 3027-3044.
- Q. Li, X. Lu, Y. Wang, **X. Huang**, Y. Luo. Leaf Area Index identified as a major source of uncertainty in modelled CO2 fertilization. *Biogeosciences*, 2018, 15: 6909–6925.
- **X. Huang**, Q. Li, T. Zhang, Y. Luo, W. Xue. Are quantitative sensitivity analysis methods always reliable in parameter screening? A*GU Fall Meeting*, 2016, poster.
- T. Zhang, L. Li, Y. Lin, W. Xue, **X. Huang**. An automatic and effective parameter optimization method for model tuning. *Geoscientific Model Development*, 2015, 8: 3791-3822.

HONORS AND AWARDS

Earth Science Awards funded by Schlumberger Co., Ltd. Tsinghua University, *2017*
Outstanding Bachelor Graduate in Sichuan Province Sichuan, *2014*
National Scholarship (1%) Ministry of National Education of China, *2013*
National Encouragement Scholarship (1%) Ministry of National Education of China, *2012*
National First Prize Scholarship (0.5%) Ministry of National Education of China, *2011*

TECHNICAL STRENGTHS

Programming languages: Python, R, Matlab, C/C++, Fortran, Java, NCL, Shell, HTML/CSS
Proficient tools: OpenMP, MPI, Docker, TensorFlow, PyTorch, ArcGIS, Tableau, D3.js