Lijing Wang

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PROFESSIONAL EXPERIENCE

Lawrence Berkeley National Laboratory (LBNL)

Postdoctoral Fellow, Climate & Ecosystem Science Division   2023/04 - present

University of Connecticut

Assistant Professor, Department of Earth Sciences   expected 2024/08

EDUCATION

Stanford University

Ph.D. in Geological Sciences   2017/09 - 2023/03
(Now Earth and Planetary Sciences)
Ph.D. minor in Computer Science   2021/09 - 2023/03
Dissertation title: *Integrating data and models for sustainable decision-making in hydrology*
Committee: Jef Caers (Primary advisor), Kate Maher, Tapan Mukerji, Peter Kitanidis, Mykel Kochenderfer

Peking University

B.S. in Space Physics and Applied Mathematics   2013/09 - 2017/07

Hong Kong University of Science and Technology

Physics, exchange program with a full-tuition scholarship   2014/09 - 2014/12

RESEARCH INTERESTS

Model-data integration for hydrology, machine learning-based inverse methods, data science for geosciences, stochastic geomodeling, non-stationary geostatistics, decision making for uncertain hydrologic systems

BOOKS

[1] **L. Wang**, Z. Yin, J. Caers, Data Science for the Geosciences, *Cambridge University Press*, 2023

MANUSCRIPTS UNDER REVIEW AND IN PREPARATION

[16] **L. Wang**, T. Babey, Z. Perzan, S. Pierce, M. Briggs, D.B. Rodgers, J.R. Bargar, K. Maher, Revealing beavers' influence on local and regional hydrologic variations: hydrologic modeling and calibration in an intermountain floodplain aquifer, 2023 (in prep.)

[15] T. Babey, Z. Perzan, S. Pierce, D.B. Rodgers, **L. Wang**, R. Carroll, J.R. Bargar, K. Boye, K. Maher, Spatiotemporal response of soil-gravel bed connectivity to hydrological transitions in an intermountain floodplain aquifer, 2023 (in prep.)

[14] X. Wei, Z. Yin, C. Scheidt, K. Darnell, **L. Wang**, J. Caers, Constructing priors for geophysical inversions constrained by surface and borehole geochemistry, *Surveys*

in Geophysics, under review, 2023

[**13**] T. Kurihana, I. Mastilovic, **L. Wang**, A. Meray, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Identifying climate patterns using clustering autoencoder techniques, *Artificial Intelligence for the Earth Systems*, under review, 2023

[**12**] A. Miltenberger, **L. Wang**, T. Mukerji, J. Caers, Formulating and solving the data-consistent geophysical inverse problem for subsurface modeling applications, *Computational Geosciences*, under review, 2023

JOURNAL
PUBLICATIONS

[**11**] A. Meray*, **L. Wang***, T. Kurihana, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Physics-informed surrogate modeling for supporting climate resilience at groundwater contamination sites, *Computers & Geosciences*, accepted, 2023

[**10**] **L. Wang**, L. Peeters, E.J. MacKie, Z. Yin, J. Caers, Unraveling the uncertainty of geological interfaces through data-knowledge-driven trend surface analysis, *Computers & Geosciences*, 2023

[**9**] E.J. MacKie, M. Field, **L. Wang**, Z. Yin, N. Schoedl, M. Hibbs, A. Zhang, GStatSim V1.0: a Python package for geostatistical interpolation and simulation, *Geoscientific Model Development*, 2023

[**8**] **L. Wang**, H. Kim, A. V. Christiansen, B. Hansen, J. Caers, Statistical modeling of 3D redox architecture from non-colocated redox borehole and transient electromagnetic data, *Hydrogeology Journal (SI: Geostatistics and Hydrogeology)*, 2023

[**7**] **L. Wang**, F. Joncour, P. Barrallon, T. Harribey, L. Castanie, S. Yousfi, S. Guillon, Semi-supervised semantic segmentation for seismic interpretation, *Geophysics*, 2023

[**6**] T. Hall, C. Scheidt, **L. Wang**, Z. Yin, T. Mukerji, J. Caers, Sequential value of information for subsurface exploration drilling, *Natural Resources Research*, 2022

[**5**] **L. Wang**, P. Kitanidis, J. Caers, Hierarchical Bayesian inversion of global variables and large-scale spatial fields, *Water Resources Research*, 2022

[**4**] J. Caers, C. Scheidt, Z. Yin, **L. Wang**, T. Mukerji, K. House, Efficacy of information in mineral exploration drilling, *Natural Resources Research*, 2022

[**3**] A. Miltenberger, S. Uhlemann, T. Mukerji, K. Williams, B. Dafflon, **L. Wang**, H. Murakami-Wainwright, Probabilistic evaluation of geoscientific hypotheses with geophysical data: application to electrical resistivity imaging of a fractured bedrock zone, *Journal of Geophysical Research - Solid Earth*, 2021

[**2**] E. C. Johnston, F. Davenport, **L. Wang**, J. Caers, S. Muthukrishnan, M. Burke, N. S. Diffenbaugh, Quantifying the influence of precipitation intensity on landslide hazard in urbanized and non-urbanized areas, *Geophysical Research Letters*, 2021

[1] Q. Li, **L. Wang**, Z. Perzan, J. Caers, G. Brown, J. Bargar, K. Maher, Global sensitivity analysis of a reactive transport model for mineral scale formation during hydraulic fracturing, *Environmental Engineering Science*, 2021

CONFERENCE
PUBLICATIONS

[2] **L. Wang**, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Murakami-Wainwright, Multi-scale Digital Twin: Developing a fast and physics-infused surrogate model for groundwater contamination with uncertain climate models, *Machine Learning and the Physical Sciences Workshop at the 36th conference on Neural Information Processing Systems*, 2022

[1] R. M. Rustowicz, R. Cheong, **L. Wang**, S. Ermon, M. Burke, D. Lobell, Semantic segmentation of crop type in Africa: A novel dataset and analysis of deep learning methods, *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops*, 2019

INVITED TALKS

University of Arizona | Department of Hydrology and Atmospheric Sciences Seminar   Apr 2023

SLAC National Accelerator Laboratory | Environmental Geochemistry Group Research Talk   Mar 2023

University of Connecticut | Department of Earth Sciences Seminar   Feb 2023

University of Florida | Department of Geological Sciences Seminar   Jan 2023

TEACHING AND
MENTORING

Data Science for Geoscience (GEOLSCI 6, GEOLSCI 240)
Teaching Assistant, Stanford University   2019 - 2022

- Taught both graduate level ($\sim$ 40 students) and undergraduate level ($\sim$ 15 students) classes
- Developed new course materials including geoscientific data case studies, python notebooks and homework
- Mentored students to apply data science tools to their own geoscientific problems
- Designed a new textbook: Data Science for the Geosciences

Data Science for Social Good Summer Program
Technical Mentor, Stanford Data Science, Stanford University   Summer 2021

- Mentored three student fellows: one graduate and two undergraduate students
- Technical mentor for the project: Measuring spatial-temporal change of physical conditions in neighborhoods with street view imagery
- Designed computer vision tutorials for student fellows
- Organized guest seminars for student fellows

SERVICE	Grant Reviewer: National Scientific Foundation − Hydrologic Sciences	
	Reviewer: Water Resources Research, Advanced in Water Resources, Journal of Hydrology, Hydrogeology Journal, Computers & Geosciences, Mathematical Geosciences, Geophysics, Scientific Reports	
	AGU Hydrologic Uncertainty Technical Committee	2023
	Organizing committee, AI for Scientific Discovery: From Theory to Practice, *Neural Information Processing Systems Workshop (NeurIPS 2023)*	2023
	Primary convener/session chair: Advances in Data Assimilation and Uncertainty Quantification of Water Resources Management, *AGU Fall Meeting*	2022, 2023
	Stanford Data Science Scholar Blog: Introduction to Spatial Data Analysis	2022
	Student DEI leader representative, Stanford Earth	2021 - 2022
	Graduate panelist for Stanford Earth IDEAL (Inclusion, Diversity, Equity, and Access) faculty search	2021
	Co-president in Association of Chinese Students and Scholars at Stanford	2019 - 2020
	Student organizing committee, Women in Data Science (WiDS) at Stanford Earth	2019
HONORS AND AWARDS	Outstanding Graduate Student Award ($1,000): In recognition of exceptional scholarship and research accomplishments in the Department of Earth and Planetary Sciences, Stanford University	2023
	Unexpected Discovery Innovation Award, Frontier Development Lab: Using sensitivity analysis to improve physical simulations' accuracy	2022
	Stanford Data Science Scholars Program Fellowship ($100,000): Awarded to Stanford Ph.D. students who are involved in the challenging use of data science at the frontiers of their research, 11 awardees out of 151 applications	2020 - 2022
	Society for Industrial and Applied Mathematics (SIAM) Travel Awards	2021
	Harriet Benson Fellowship Award ($5,000): honors exceptional scholarship and research accomplishments by graduate students in the Department of Geological Sciences, Stanford University	2020
	2nd Prize in Stanford Big Earth Hackathon	2018
	Meritorious in COMAP's Mathematical Contest in Modeling	2016
	Houston BAA Scholarship	2016
	Guanghua Scholarship	2014, 2015
	Dean's list in School of Science, HKUST	2014
PRESENTATION AND POSTER	**[24] L. Wang**, Z. Xu, R. Thibaut, C. Wang, M. Sprenger, S. Uhlemann, E. Smith,	

C. Ulrich, Y. Wu, H. Wainwright, K. Williams, B. Dafflon, Towards scaling up watershed modeling: Identifying representative traits in mountainous hillslopes through hydrologic modeling and data integration, *American Geophysical Union, Fall Meeting 2023* [Poster]

[**23**] K. Maher, T. Babey, **L. Wang**, K. Boye, Scaling water and nutrient exchanges across floodplain interfaces in headwater catchments, *American Geophysical Union, Fall Meeting 2023* [Talk]

[**22**] E.J. MacKie, M. Field, N. Schoedl, **L. Wang**, Z. Yin, A. Zhang, M. Gravey, GStatSim: a FAIR geostatistics software package in Python, *American Geophysical Union, Fall Meeting 2023* [Talk]

[**21**] S. Praveen, Z. Xu, H. Wainwright, **L. Wang**, A. Meray, Tackling Environmental Challenges with 3D Surrogate Models: Groundwater Contamination Prediction, *American Geophysical Union, Fall Meeting 2023* [Poster]

[**20**] X. Wei, Z. Yin, C. Scheidt, K. Darnell, **L. Wang**, J. Caers, Quantifying uncertainty for sediment-hosted mineral deposits using multiple geoscientific observations and Bayesian evidential learning, *American Geophysical Union, Fall Meeting 2023* [Poster]

[**19**] **L. Wang**, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Physics-informed surrogate modeling for supporting climate resilience at groundwater contamination sites, Technical Session: Artificial Intelligence/Machine Learning-Empowered Digitization of Environmental Systems, *RemPlex 2023 Global Summit* [Talk]

[**18**] **L. Wang**, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Physics-informed surrogate modeling for supporting climate resilience at groundwater contamination sites, *HydroML 2023 symposium* [Plenary eLightning Talk]

[**17**] **L. Wang**, C. Scheidt, Z. Yin, K. Maher, J. Caers, Parameter inversion with sequential neural density estimators: an enhanced machine learning-based inversion, *American Geophysical Union, Fall Meeting 2022* [Poster]

[**16**] **L. Wang**, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Physics-informed surrogate modeling for supporting climate resilience at groundwater contamination sites, *American Geophysical Union, Fall Meeting 2022* [Poster]

[**15**] E.J. MacKie, **L. Wang**, Z. Yin, A. Zhang, N. Schoedl, GlacierStats geostatistical software for modeling ice sheet conditions, *American Geophysical Union, Fall Meeting 2022* [Poster]

[**14**] Q. Li, K. Maher, **L. Wang**, J. Caers, A shale-water interaction model and its sensitivity to each input parameter over the entire domain, *American Geophysical*

Union, Fall Meeting 2022 [Oral]

[13] L. Wang, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Multi-scale Digital Twin: Developing a fast and physics-infused surrogate model for groundwater contamination with uncertain climate models, *Machine Learning and the Physical Sciences Workshop at the 36th conference on Neural Information Processing Systems* [Poster]

[12] L. Wang, T. Kurihana, A. Meray, I. Mastilovic, S. Praveen, Z. Xu, M. Memarzadeh, A. Lavin, H. Wainwright, Physics-informed surrogate modeling for supporting climate resilience at groundwater contamination sites, *Frontier Development Lab 2022 Live Showcase* [Oral]

[11] L. Wang, Z. Perzan, T. Babey, M. Briggs, S. Pierce, B. Rogers, J. Bargar, K. Maher, Uncertainty quantification of water exchanges due to beaver-induced inundation, *American Geophysical Union, Fall Meeting 2021* [Oral]

[10] E.J. MacKie, **L. Wang**, D.M. Schroeder, C. Zuo, Z. Yin, J. Caers, M. Hibbs, The parallel worlds of DEMOGORGN Greenland, *American Geophysical Union, Fall Meeting 2021* [Oral]

[9] T. Babey, Z. Perzan, B. Rogers, **L. Wang**, S. Pierce, J. Bargar, K. Maher, Hydro-biogeochemical response of oxic-anoxic interfaces to beaver dam construction in a simulated floodplain aquifer, *American Geophysical Union, Fall Meeting 2021* [Poster]

[8] L. Wang, L. Peeters, J. Caers, Quantifying uncertainty of non-stationary geological interfaces: Metropolis-Hasting sampling of implicit level sets, *SIAM Conference on Mathematical & Computational Issues in the Geosciences, 2021* [Oral]

[7] L. Wang, T. N. Vilhelmsen, J. Caers, Local decision making through understanding of multi-scale uncertainty: Application to well catchment protections in Denmark *Computational Methods in Water Resources, 2020* [Oral]

[6] L. Wang, L. Peeters, J. Caers, Uncertainty assessment of hydrogeological structures combining geophysical survey and geological knowledge: A stochastic level set optimization framework, *American Geophysical Union, Fall Meeting 2020* [Oral]

[5] L. Wang, T. N. Vilhelmsen, J. Caers, Direct forecasting of local hydraulic conductivity using combined geophysical and hydrological data: Application to well catchment predictions in Danish aquifer system, *American Geophysical Union, Fall Meeting 2019* [Poster]

[4] L. Wang, T. N. Vilhelmsen, J. Caers, Joint Uncertainty Quantification on Spatial and Global Hydrogeological Models: An Application to Danish Groundwater Management, *American Geophysical Union, Fall Meeting 2018* [Poster]

[3] E. C. Johnston, J. Caers, **L. Wang**, F. Davenport, S. Muthukrishnan, N. S.

Diffenbaugh, Multi-scale signatures of climate change on landslide susceptibility: a case study for the Pacific Coast of the United States, *American Geophysical Union, Fall Meeting 2018* [Poster]

[2] **L. Wang**, O. Grujic, J. Caers, Reconstruction and Forecasting Oil Rates Using Functional Data Analysis and Universal Co-Kriging, *NGI Industrial Affiliates Meeting, Stanford University, 2017* [Poster]

[1] **L. Wang**, O. Grujic, J. Caers, Statistical Learning on Incomplete Production Profiles of Unconventional Reservoirs, *NGI Industrial Affiliates Meeting, Stanford University, 2016* [Poster]

INDUSTRIAL EXPERIENCE

Data Science Intern, TotalEnergies   Summer 2020
- AI & Geosciences Program based in Google Cloud Advanced Solutions Lab
- Developed a semi-supervised learning framework to optimize geophysical data interpretation with limit labels
- Quantified uncertainty of the semi-supervised learning framework in order to do active learning and help experts' sequential geophysical interpretations

SKILLS

Programming languages: Python, R, MATLAB, C/C++
Deep Learning Framework: TensorFlow, Keras, PyTorch
Other Software: LaTeX, Git, Jupyter Notebook, Google Cloud, Azure