Zhi "Allen" Li, PhD

Stanford Doerr School of Sustainability Dean's Postdoc Fellow
120 David L Boren Blvd, Norman, OK 73072, +1 (405) 534-7977, li1995@stanford.edu
LinkedIn: https://www.linkedin.com/in/zhi-li-a79116167
Website: http://hydrors.us
ResearchGate: https://www.researchgate.net/profile/Zhi-Li-179
Google Scholar: https://scholar.google.com.sg/citations?user=JQ7mr1QAAAAJ&hl=en

Career Objective:
Develop a Water Science Community Collaboratory. Be recognized as a domain expert specializing in hydrologic sciences, by developing unique datasets, co-producing actionable knowledge by integrating scientists, stakeholders, and communities, educate and mentor students in geosciences, water and environmental justice.

Domain Expertise (Keywords):
Hydrologic modeling (CREST, LIS, MODFLOW, SUPERFLEX), Flooding and Drought, Remote Sensing (GPM, Landsat, Sentinel-1, MODIS, GRACE, CYGNSS, SMAP), Extreme Events, Weather Forecast Model (WRF), Climate Change (CMIP5/6), Environment/Climate Injustice

Professional Preparation:
E1. **Stanford Doerr School of Sustainability Dean's Postdoc Fellow,** 2023 - 2025
   Department of Earth System Science, Stanford University
E2. **Ph.D. in Hydrology and Water Security,** 2019 – 2022.7
   School of Civil Engineering and Environmental Science, University of Oklahoma (OU), USA (GPA: 3.87/4)
E3. **M.S. in Hydraulic Engineering & Water Resources Management,** 2017 – 2019.
   Civil and Environmental Engineering, National University of Singapore (NUS), Singapore (GPA: 4.68/5)
E4. **B.Eng. in Hydraulic Engineering,** 2013 – 2017
   Water Conservancy & Hydropower, Hohai University, China (GPA: 4.48/5)

Other Academic Experience:
TE1. Graduate Teaching Assistant Fellowship and TA for the following graduate courses: Climate change and Water sustainability (40 students, Fall 22), Hydrology (40 students, Fall 21, Spring 22), Fundamental Hydrology (46 students, Summer and Spring 21), Quantitative Hydrology (35 students, Fall 20), and undergraduate course in Statics (30 students, Fall 19). Certified for classroom teaching.

Student Co-mentoring:
SC1. *2022*, Sebastian Ferraro (University of Oklahoma), Impacts of climate change on hydrologic engineering design, I serve as an invited committee member for master's thesis
SC2. *2022*, Theresa Tsoodle (University of Oklahoma), Remote Sensing to Build Flood-resilient Community for Native American Tribes, I serve as an invited committee member for master's thesis
SC3. *2022*, Haotong Jing (University of Florida), Does landscape evolution cause more convective precipitation? I serve as an invited committee member for master's thesis
SC4. *2021*, Farinaz Gholami (Hohai University), Using CREST-iMAP framework to assess flood risks and damages by Hurricane Harvey, I served as a co-advisor
SC5. *2020*, Matt Edgar (undergrad student at OU): Super-sampling Precipitation Through Deep Learning Approaches, I served as an advisor for the OU undergrad research program

Community Activities and Partnerships:
CA1. 2022, Evaluate the impact of wastewater discharge on water quantity, quality, and downstream ecology with community engagement and indigenous knowledge
CA2. 2022, Volunteer for City of Austin, Office of Sustainability Austin's future climate, website and communication
CA3. 2022, Volunteer data scientist for Muscogee Creek Nation and Otoe-Missouri Nation to build climate-resilient Native American tribes

CA4. 2020-2021, Hydrology modeling and training for capacity building with country representatives from Africa as part NASA SEVIER and NSF PIRE project through University of Oklahoma
CA5. 2023, NASA Openscape cohort open source community to promote open science

Working Experience:

WE.1   Data Scientist   2019.1 – 2019.8
          Hydroinformatics Institute, Singapore

Honors and Awards:

HA.1 2023-2025, Stanford Doerr School of Sustainability Postdoctoral Fellow, Stanford University
HA.2 2022, Graduate College Excellence in Dissertation Award, University of Oklahoma
HA.3 2022, Graduate College Hoving Fellowship, University of Oklahoma
HA.4 2015, Social Work Scholarship, Hohai University
HA.5 2015, Excellence Student Leader Award, Hohai University
HA.6 2014, Academic Scholarship, Hohai University
HA.7 2014, Spiritual and Cultural Scholarship, Hohai University
HA.8 2013, Excellent Volunteer Award of the 2014 Nanjing Youth Olympic Games

Professional Recognitions:

PR1. 2022, Research work featured by over **75** news media; interviewed by *The New York Times, Independent, AccuWeather, CNN.*
PR2. 2020-2022, published **25** published peer-review papers (**12** first authored) and 1 invited book chapter. Papers Cited **183** times since 2020 (Google Scholar).
PR3. 2020-2022, Attended **5** international conferences, 4 oral presentation, 1 poster presentation
PR4. 2020-2022, Served as invited reviewer for **10** international journals

Professional Services:

P1   Associate Editor, *Journal of Applied Meteorology and Climatology*
P2   Invited Reviewer for: *Remote Sensing of Environment, Geophysical Research Letters, Remote Sensing, Water Resources Research, Journal of Hydrology, Journal of Hydrometeorology, Journal of Hydrology: Regional Studies, Journal of Hydrologic Engineering, Natural Hazards, Environmental Science and Ecotechnology, Hydrological Science Journal, Journal of Applied Meteorology and Climatology, Advances in Water Resources*

Published Journal Articles:
Community Products and Utilization

CP1   **Li, Zhi**, Wen, Y., Liao, L., Wolff, D., Meneghini, R., Schuur, T., Joint Collaboration on comparing NOAA's ground-based weather radar and NASA's spaceborne radar, Bulletin of the American Meteorological Society, in press. {first study comparing country ground weather radar and spaceborne radar}
CP2   Chen, M., Huang, Y., **Li, Z.**, Larico, A.J.M., Xue, M., Hong, Y., Hu, X.-M., Novoa, H.M., Martin, E., McPherson, R., Zhang, J., Gao, S., Wen, Y., Perez, A.V., Morales, I.Y. Cross-Examining Precipitation Products by Rain Gauge, Remote Sensing, and WRF Simulations over a South American Region across the Pacific Coast and Andes. *Atmosphere*, 13, 1666. https://doi.org/10.3390/atmos13101666. {Triple Collocation analysis of GPM IMERG, WRF outputs, and GPCP gauges in Andes where precipitation observed from space and by gauges are quite uncertain}
CP3   **Li, Zhi**, Gao, S., Chen, M., Gourley, J. J., Liu, C., Prein, A. F., & Hong, Y. (2022). The conterminous United States are projected to become more prone to flash floods in a high-end emissions scenario. *Communications Earth & Environment*, 3(1), 1-9. {First study to quantify flash flood potential in the US in a warmer climate}{This article is in the 99th percentile (ranked 1,183rd) of the 342,977 tracked articles of a similar age in all journals and the 1st percentile (ranked 1st) of the 1 tracked articles of a

similar age in Communications Earth & Environment}

CP4   **Li, Zhi**, Gao, S., Chen, M., Gourley, J. J., & Hong, Y. (2022). Spatiotemporal characteristics of US floods: Current status and forecast under a future warmer climate. *Earth's Future*, 10, e2022EF002700. https://doi.org/10.1029/2022EF002700 {Quantify extreme rainfall and flood seasonality identifying more frequent, widespread, yet less seasonal rainfall and flood events in the future}

CP5   **Li, Zhi**, Tang, G., Kirstetter, P., Gao, S., Li, J.-L. F., Wen, Y., & Hong, Y. (2021). Evaluation of GPM IMERG and its constellations in extreme events over the conterminous United States. *Journal of Hydrology*, 267, 112725. https://doi.org/10.1016/j.jhydrol.2021.127357. {Continental-scale evaluation of satellite precipitation utilities during extreme rainfall events}

CP6   **Li, Zhi**, Tang, G., Hong, Z., Chen, M., Gao, S., Kirstetter, P., . . . Hong, Y. (2021). Two-decades of GPM IMERG early and final run products intercomparison: Similarity and difference in climatology, rates, and extremes. *Journal of Hydrology*, 594, 125975. {Global evaluation of satellite precipitation product utilities and its applicability in real time weather forecast}

CP7   Yami, T. L., Gao, S., Chen, M., **Li, Zhi**, Vergara, H., Clark, R. R., . . . Hong, Y. (2021). CREST/EF5 capacity building to enhance resilience to hydrodynamic disasters in emerging regions. *African Journal of Environmental Science and Technology*, 15 (6), 230–242. {Capacity building project to use hydrologic models/tools to protect African local residents}

CP8   **Li, Zhi**, Chen, M., Gao, S., Gourley, J. J., Yang, T., Shen, X., . . . Hong, Y. (2021). A multi-source 120-year us flood database with a unified common format and public access. *Earth System Science Data*, 13 (8), 3755–3766. doi: 10.5194/essd-13-3755-2021. {The longest flood data sets in the US by multi-source collections}

CP9   **Li, Zhi**, Chen, M., Gao, S., Hong, Z., Tang, G., Wen, Y., . . . Hong, Y. (2020). Cross-examination of similarity, difference and deficiency of gauge, radar and satellite precipitation measuring uncertainties for extreme events using conventional metrics and multiplicative triple collocation. *Remote Sensing*, 12 (8), 1258. {Investigate the uncertainties of precipitation products derived from three sources: satellite, weather radar, and in-situ gauges}

CP10   Sui, X., **Li, Zhi**, Ma, Z., Xu, J., Zhu, S., & Liu, H. (2020). Ground validation and error sources identification for GPM IMERG product over the southeast coastal regions of China. *Remote Sensing*, 12 (24), 4154. {Satellite precipitation products error identification in coastal regions}

CP11   Wang, T., **Li, Zhi,** Ma, Z., Liu, C., Tang, G., Diverging identifications of extreme precipitation events from satellite observations and reanalysis products: a global perspective based on an object-tracking method, *Remote Sensing of Environment*, 288, 113490, doi: 10.1016/j.rse.2023.113490. {a global rainfall tracking algorithm is applied to compare the utility of different precipitation products.}

Flood Model Development

FD1   **Li, Zhi**, Gao, S., Chen, M., Gourley, J., Mizukami, N., and Hong, Y.: CREST-VEC: A framework towards more accurate and realistic flood simulation across scales, *Geoscientific Model Development*, https://doi.org/10.5194/gmd-2022-61, 2022. {Developed an efficient and accurate flood forecast framework that can operate globally in real time}

FD2   **Li, Zhi**, Chen, M., Gao, S., Luo, X., Gourley, J. J., Kirstetter, P., . . . Hong, Y. (2021). CREST-iMAP v1. 0: A fully coupled hydrologic-hydraulic modeling framework dedicated to flood inundation mapping and prediction. *Environmental Modelling & Software*, 141, 105051. {Developed a coupled system that integrates hydrologic process and hydraulic routing for flood prediction}

FD3   Chen, M., **Li, Zhi**, Gao, S., Luo, X., Wing, O. E., Shen, X., . . . Hong, Y. (2021). A comprehensive flood inundation mapping for hurricane Harvey using an integrated hydrological and hydraulic model. *Journal of Hydrometeorology*, 22 (7), 1713–1726. {Proof-of-concept study to use the integrated hydrological-hydraulic model framework for flood prediction}

FD4   Chen, M., **Li, Zhi,** Gao, S., Xue, M., Gourley, J. J., Kolar, R. L., & Hong, Y. (2022). A flood predictability study for Hurricane Harvey with the CREST-iMAP model using high-resolution quantitative precipitation forecasts and U-Net deep learning precipitation nowcasts. *Journal of Hydrology*, 128168.

Process-Scale Studies

PS1 **Li, Zhi**, Chen, M., Gao, S., Wen, Y., Gourley, J. J., Yang, T., Kolar, R., & Hong, Y. (2022). Can re-infiltration process be ignored for flood inundation mapping and prediction during extreme storms? A case study in Texas Gulf Coast region. *Environmental Modelling & Software*, *155*, 105450. https://doi.org/10.1016/j.envsoft.2022.105450. {Answered the scientific question of whether re-infiltration process in Hydrology is important and can be ignored in flood inundation mapping during extreme events}

PS2 Gao, S., **Li, Zhi,** Chen, M., Lin, P., Hong, Z., Allen, D., . . . Hong, Y. (2021). Spatiotemporal variability of global river extent and the natural driving factors revealed by decades of Landsat observations, GRACE gravimetry observations, and land surface model simulations. *Remote Sensing of Environment*, 267, 112725. {A Global study of investigating spatiotemporal hydrologic processes using modern satellite products}

PS3 **Li, Zhi**, Wen, Y., Schreier, M., Behrangi, A., Hong, Y., & Lambrigtsen, B. (2021). Advancing satellite precipitation retrievals with data driven approaches: Is black box model explainable? *Earth and Space Science*, 8 (2), e2020EA001423. {One of the first machine learning interpretation used in satellite precipitation retrievals}

PS4 Gao, S., Chen, M., **Li, Zhi**, Cook, S., Allen, D., Neeson, T., . . . Hong, Y. (2021). Mapping dynamic non-perennial stream networks using high-resolution distributed hydrologic simulation: A case study in the upper blue river basin. *Journal of Hydrology*, 126522. {One of the first use of hydrological models to interpret stream intermittency}

PS5 Gao, S., **Li, Zhi**, Chen, M., Allen, D., Neeson, T., & Hong, Y. (2021). Monitoring drought through the lens of Landsat: Drying of rivers during the California droughts. *Remote Sensing*, 13 (17). doi: 10.3390/rs13173423. {The use of remote sensing optical sensors to detect river intermittency}

PS6 Sui, X., Li, Zhi, Tang, G., Yang, Z-L., Niyogi, D. (2022). Disentangling error structure of three precipitation products using decision trees. Remote Sensing of Environment, 280, 113185. {interpreting machine learning black box and discover what has been learned.}

Articles Under Review / in Revision

AR1 **Li, Zhi**, Gao, S., Chen, M., Zhang, J., Gourley, J.J., Wen, Y., Yang T., Hong, Y., Introducing Flashiness-Intensity-Duration-Frequency Curve: a New Metric to Quantify Flash Flood Intensity, Geophysical Research Letters, under review.

AR2 **Li, Zhi**, Xue, X., Clark, R., Vergara, H., Gourley, J.J., Tang, G., Shen, X., Chen, M., Gao, S., Zhang, J., Wen, Y., Yang, T., Kirstetter, P., Hong, Y., Decadal development of CREST model family: review, applications, and outlook. *Journal of Hydrology*, under review. {Review paper of ten-year development and application of our hydrological model.}

AR3 **Li, Zhi**, Tiwari, A., Sui, X., Garrison, J., Marks, F., Niyogi, D., Studying Brown Ocean Re-intensification of Hurricane Florence Using CYGNSS and SMAP Soil Moisture Data and a Numerical Weather Model, Geophysical Research Letters, under review.

AR4 **Li, Zhi**, Tsoodle, T., Chen, M., Gao, S., Zhang, J., Wen, Y., Yang, T., Hong, Y., Future extreme rainfall and flood risks for Native America under climate and demographic change: A case study in Oklahoma, *Weather, Climate, and Society, in revision.*

Book Chapters

BC1. Chen, M., **Li, Zhi,** and Gao, S. (2022). Multisensor Remote Sensing and the Multidimensional Modeling of Extreme Flood Events. In Remote Sensing of Water-Related Hazards (eds K. Zhang, Y. Hong and A. AghaKouchak). https://doi.org/10.1002/9781119159131.ch5. {Use of state-of-the-art integrated hydrologic-hydraulic model system to predict water-related natural hazards - floods}

Invited Talks:

I1 Five 1-in-1000-year floods in five weeks: what are we learning from it? Presented at NASA/UAH AES seminar, invited by Prof. Udaysankar Nair

I2 Advancing flood characterization through data, model, and application. Presented at Bureau of

Economic Geology, University of Texas at Austin, invited by Dr. Alexander Sun.

Conference Presentations:

C1   Introducing Flashiness-Intensity-Duration-Frequency curve: A New Metric to Quantify Flash Flood intensity, International Precipitation Conference 14, Oral presentation

C2   Applying a merged CYGNSS and SMAP soil moisture product in investigating the Brown Ocean effect: A case study during Hurricane Florence, AMS 2023 Meeting, Oral presentation

C3   Future US floods under a warmer climate: frequency, flashiness, spatial extent, and seasonality, AGU 2022 Fall Meeting, Oral presentation

C4   Floods in the United States are becoming more frequent, wider spread, flashier, yet less seasonal, *OU 2022 Water International Conference*, Oral presentation.

C5   Spatiotemporal Flood Characteristics in the United States: Current Status and Future Projection, *AMS Annual Meeting*, 2022, Houston, Oral presentation.

C6   Explainable AI models for precipitation retrievals: a case study based on atmospheric sounding systems, *AGU Fall meeting 2021*, New Orleans, Poster presentation

C7   Advancing satellite precipitation retrievals with data driven approaches: is black box explainable? *NASA AIRS Science Team Meeting, 2021*, online, Oral presentation

C8   Two decades of GPM IMERG early and final run products intercomparison: similarity and differences in climatology, rates, and extremes, *AGU Fall meeting 2020*, online, Oral presentation

Software and Community/Educational Tools:

The Coupled Routing and Excess Storage model – flood inundation Mapping and Prediction (CREST-iMAP) Primary developer for a C programing language based open-source software for high-resolution flood inundation prediction. It has been used to predict inland flood inundation during Hurricane Harvey.

Ensemble Framework For Flash Flood Forecast (EF5) Version 1.3   Primary developer for a distributed hydrologic model framework that efficiently works for large-scale streamflow simulation. The system has been operated by the NOAA/National Severe Storms Laboratory.

ePING Android App and dashboard Developed an Android-based cell phone application used for citizen scientists trained in Africa to collect hydrometeorological data. It has been used by the NSF PIRE project.

US flood inundation dashboard Primary developer for a Google Earth Engine-enabled US flood inundation dashboard, with data- model fusion. It has been used as educational materials in the Hydrology graduate course.

US flood events dashboard Main developer for a dashboard to display US major flood events since 1900. It has been used as educational materials in the Hydrology and other graduate-level courses.

In the News:

N1	Five 1-in-1000-year floods in five weeks	AccuWeater	Interview
N2	How Is Climate Change Affecting Floods?	The New York Times	Interview
N3	Why US floods are getting 'flashier'	Indenpendent	Interview
N4	Climate change increasing frequency of major flooding events in Green Country	ABC News	Interview
N5	The U.S. Has Been Hit by Dramatic Flooding, and It Could Get Worse	Wall Street Journal	Interview
N6	Flash floods are set to become much more common in the U.S.	Earth.com	News report
N7	Central U.S. to emerge as flash flooding hotspot, study finds	StateImpact Oklahoma	News report
N8	A New Study Finds U.S. Future Floods Becoming More Frequent, Wider Spread, Yet Less Seasonal	OU VPRP	News report
N9	Flash Floods will increase across the United States, new Research suggests	NOAA NSSL News	News report
N10	Central US to emerge as flash flooding hotspot, study finds	KOSU	News report

A list of 71 news is at https://nature.altmetric.com/details/126039395/news

Proposal Involvement:

PI.1 2022 EPA-G2022-STAR-J1: Enhanced Aquifer Recharge Performance and Potential Risk in Different Regional and Hydrogeologic Settings, Co-PI, collaborating with UT Center for Space Research, in preparation.

PI.2 2022 Oklahoma Water Grant: Delineate floodplain boundaries for tribal Nations in Oklahoma under a warmer climate, Co-PI, submitted.

PI.3 2022 NASA ROSES proposal – Environmental and Climate Justice for flood resilience, Invited Collaborator with Prof Yixin Wen (University of Florida), in preparation.

PI.4 2022 BIA (Bureau of Indian Affairs) Climate Adaptation to Support Tribal Climate Resilience, Collaborator with Muskogee Nation Environmentalists, submitted.

PI.5 2022 NASA Precipitation Measurement Missions Science Team project, Validating and better understanding GPM/DPR vertical profiles of reflectivity and microphysics using Quasi-Vertical Profiles (QVP) from operational WSR-88D polarimetric radar system, collaborated with Dr. Robert Meneghini (NASA scientist) and Dr. Terry Schuur, Dr. Alexander Ryzhkov (NOAA/NSSL/OU).

PI.6 2021 NASA Citizen Science for Earth Systems Program, Characterizing and Enhancing Citizen Science Rainfall Reports from the Global Learning and Observations to Benefit the Environment (GLOBE) Program to Anticipate a New Robust Dataset for NASA GPM Project Validation, collaborated with Dr. Yixin Wen (NOAA/NSSL/OU).