Zhi Li, PhD

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Education and Training:

Stanford Doerr School of Sustainability Dean's Postdoc Fellow, 2023 - 2025
Department of Earth System Science, Stanford University

Ph.D. in Hydrology and Water Security, 2019 – 2022
School of Civil Engineering and Environmental Science, University of Oklahoma (OU), USA

M.S. in Hydraulic Engineering & Water Resources Management, 2017 – 2019
Civil and Environmental Engineering, National University of Singapore (NUS), Singapore
Delft University of Technology (Exchange student)

B.Eng. in Hydraulic Engineering, 2013 – 2017
Water Conservancy & Hydropower, Hohai University, China

Community Activities and Partnerships:

2024, Stanford Doerr School of Sustainability DEI liaison.
2023, Stanford Doerr School of Sustainability Recruiting Ambassador, responsible for promoting JEDI efforts, recruiting undergrad, grad, and postdoc around the world
2023, NASA Openscape cohort open source community to promote open science
2022, Evaluate the impact of wastewater discharge on water quantity, quality, and downstream ecology with community engagement and indigenous knowledge
2022, Volunteer for City of Austin, Office of Sustainability Austin's future climate, website and communication
2022, Volunteer data scientist for Muscogee Creek Nation and Otoe-Missouri Nation to build climate-resilient Native American tribes
2020-2021, Hydrology modeling and training for capacity building with country representatives from Africa as part NASA SEVIER and NSF PIRE project through the University of Oklahoma

Honors and Awards:

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

Professional Service:

2022 - , Associate Editor, *Journal of Applied Meteorology and Climatology*
2024, Invited reviewer for the NASA Climate Resilience proposal

2023, American Geophysical Union session H013 primary convener – "Advancements in Hydrological Digital Twin"

2020 - , Invited Reviewer for: *Remote Sensing of Environment*, *Geophysical Research Letters*, *Earth's Future*, *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*, *Scientific Data*

Selected Publications (* indicates Corresponding author)**:**

1 **Li, Zhi**, Tsoodle, T., Chen, M., Gao, S., Zhang, J., Wen, Y., Yang, T., Hong, Y. (2024), Future extreme rainfall and flood risks for Native America under climate and demographic change: A case study in Oklahoma, ***Weather, Climate, and Society***, doi:10.1175/WCAS-D-23-0005.1 {Investigating climate injustice issues present in Tribal Nations in Oklahoma}.

CP1. Zhu, S., **Li, Zhi*,** Chen, M., Zhang, J., Gourley, J.J., Wen, Y., Yang T., Hong, Y., Can we trust GPM IMERG for climatological research? ***Environmental Research Letters***, 20, 014064, https://doi.org/10.1088/1748-9326/ad984e.

CP2. Zhu, S., **Li, Zhi***, Chen, M., Wen, Y., Gao, S., Zhang, J., Wang, J., Nan, Y., Ferraro, S., Tsoodle, T., Hong, Y., How has the latest IMERG V07 improved the precipitation estimates and hydrologic utility over CONUS against IMERG V06? ***Journal of Hydrology***, 645, 132257, https://doi.org/10.1016/j.jhydrol.2024.132257.

CP3. Gao, S., **Li, Zhi**, Grant, G., Mattes, H., Shadi, F., Vogel, J., Neeson, T., Strevett, K., Hong, Y. (2023). Is Wastewater Reuse a Sustainable Solution to Water Supply Under Climate Change? A Case Study in Upper Red River Basin, Oklahoma, ***Journal of American Water Resources Association***, 60, 865-878, https://doi.org/10.1111/1752-1688.13208.

CP4. **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***, 20, 100159. {Review paper of ten-year development and application of our hydrological model.}

CP5. Zhang, J., Chen, M., Gao, S., **Li, Zhi**, Vörösmarty, C. J., Fekete, B., Miara, A., & Hong, Y. (2023). Examining impacts of policy, technology, and climate extremes on thermoelectric power production and river thermal pollution in the Midwest and Northeast of the United States. ***Frontiers in Environmental Science***, 11, 1212211. https://doi.org/10.3389/fenvs.2023.1212211

CP6. Wang, Y., **Li**, **Zhi**, Gao, L. Zhong, Y., and Peng, X., 2023. Comparison of GPM IMERG Version 06 Final Run Products and Its Latest Version 07 Precipitation Products across Scales: Similarities, Differences and Improvements *Remote Sensing* 15, no. 23: 5622. https://doi.org/10.3390/rs15235622

CP7. **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***, 104, E1435-E1451. {first study comparing country ground weather radar and spaceborne radar}

CP8. 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}

CP9. **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}

CP10. **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}

CP11. **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}

CP12. **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}

CP13. 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}

CP14. **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}

CP15. **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}

CP16. 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}

CP17. 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.}

CP18. Hong, Z., Moreno, H.,; **Li, Zhi,** Li, S. Greene, J., Hong, Y., Alvarez, L., 2022, Triple Collocation of Ground-, Satellite-and Land Surface Model-Based Surface Soil Moisture Products in Oklahoma—Part I: Individual Product Assessment, ***Remote Sensing***, 14, 22,5641.

CP19. Hong, Z., Moreno, H., Alvarez, L., Li, Zhi, Hong, Y., 2023, Triple Collocation of Ground-, Satellite- and Land Surface Model-Based Surface Soil Moisture Products in Oklahoma Part II: New Multi-Sensor Soil Moisture (MSSM) Product, ***Remote Sensing***, 15, 13

Flood Model Development

FD1. Chen, M., **Li, Zhi,** Vergara, H., Gourley, J. J., Xue, M., Hong, Y., Hu, X., Novoa, H., Martin, E.R., McPherson, R.A., Gao, S., Perez, A. V., Morales, I. Y. (2023). CONUS-wide model calibration and validation for CRESTv3.0 - an improved Coupled Routing and Excess STorage distributed hydrological model. ***Journal of Hydrology***, in press.

FD2. Sun, A. Y., **Li, Zhi**, Lee, W., Huang, Q., Scanlon, B. R., & Dawson, C. (2023). Rapid Flood Inundation Forecast Using Fourier Neural Operator. ArXiv. /abs/2307.16090

FD3. **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}

FD4. **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}

FD5. 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}

FD6. 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. Kisembe, J., Li, L. F., Wen, Y., Lee, L., Qian, W., **Li, Z.,** & Jiang, J. H. (2024). Assessing the Impacts of Falling Ice Radiative Effects on the Seasonal Variation of Land Surface Properties. ***Journal of Geophysical Research: Atmospheres***, *129*(15), e2024JD040991. https://doi.org/10.1029/2024JD040991

PS2. **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***, 50, e2023GL104992, https://doi.org/10.1029/2023GL104992.

PS3. **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***, 50, 19, e2023GL105102, https://doi.org/10.1029/2023GL105102. {We investigated how the antecedent soil moisture and temperature can invigorate the landfalling storm, known as Brown Ocean Effect}

PS4. **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}

PS5. 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}

PS6. **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}

PS7. 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}

PS8. 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}

PS9. 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,** Gorelick, S., Bhandari, S., Flood Inundation Models: State of the Science, Challenges, and Frontiers, ***Environmental Research Letters***, under review.

AR2. **Li, Zhi,** Rosa, L., Gorelick, S. Severe Floods Significantly Reduces Global Rice Yields, ***Science Advances***, 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/Workshops:

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, 2022.
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, 2022.
I3. "Confronting the Deluge: An Interdisciplinary Approach to Characterize Flash Flooding in the Era of Climate Change", Drought Research Institute DHS Colloquium, invited by Dr. Guo Yu, 2023
I4. "Rising Waters, Rising Challenges: Assessing Flood Impact on Local Communities in Oklahoma and California" presented in Stanford Hydro Seminar, 2024
I5. Two-day workshop invited by Stanford Water Resources Club, 2024.
I6. Invited speaker at the 2024 Texas A&M Water Summer School [Youtube], 2024

Conference Presentations:

C1. The Future of Flash Flood Forecasting: How Can We Quantify Flash Flood Severity? AGU 2023 Fall Meeting, Oral presentation, 2023
C2. Introducing Flashiness-Intensity-Duration-Frequency curve: A New Metric to Quantify Flash Flood intensity, International Precipitation Conference 14, Oral presentation, 2023
C3. 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, 2023
C4. Future US floods under a warmer climate: frequency, flashiness, spatial extent, and seasonality, AGU 2022 Fall Meeting, Oral presentation, 2022
C5. Floods in the United States are becoming more frequent, wider spread, flashier, yet less seasonal, *OU 2022 Water International Conference*, Oral presentation, 2022
C6. Spatiotemporal Flood Characteristics in the United States: Current Status and Future Projection, *AMS Annual Meeting*, 2022, Houston, Oral presentation, 2022
C7. Explainable AI models for precipitation retrievals: a case study based on atmospheric sounding systems, *AGU Fall meeting 2021*, New Orleans, Poster presentation, 2021
C8. Advancing satellite precipitation retrievals with data driven approaches: is black box explainable? *NASA AIRS Science Team Meeting, 2021*, online, Oral presentation, 2021
C9. 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, 2020

Other Academic Experience:

AE1. CITI (Collaborative Institutional Training Initiative) certified and received human subjects approval to work with 100 million patient records
AE2. 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. *2023*, Ananya Jain (Stanford University), Flood risks in India, I serve as a co-mentor for her master project.
SC2. *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
SC3. *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
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

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 material 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.	Oklahoma Native Americans will be hit harder by floods than general state population	The Norman Transcript	Interview
N2.	Severe weather disproportionately impacts Oklahoma's native communities, study shows	OU VPRP	News report / Interview
N3.	Severe weather disproportionately impacts Oklahoma's native communities, study shows	United Nations Office for Disaster Risk Reduction	News report / Interview
N4.	Doerr School welcomes new cohort of Dean's Postdoctoral Fellows	Stanford Doerr School of Sustainability	Interview
N5.	Five 1-in-1000-year floods in five weeks	AccuWeater	Interview
N6.	How Is Climate Change Affecting Floods?	The New York Times	Interview
N7.	Why US floods are getting 'flashier'	Indenpendent	Interview
N8.	Climate change increasing frequency of major flooding events in Green Country	ABC News	Interview
N9.	The U.S. Has Been Hit by Dramatic Flooding, and It Could Get Worse	Wall Street Journal	Interview
N10.	Flash floods are set to become much more common in the U.S.	Earth.com	News report
N11.	Central U.S. to emerge as flash flooding hotspot, study finds	StateImpact Oklahoma	News report
N12.	A New Study Finds U.S. Future Floods Becoming More Frequent, Wider Spread, Yet Less Seasonal	OU VPRP	News report
N13.	Flash Floods will increase across the United States, new Research suggests	NOAA NSSL News	News report
N14.	Central US to emerge as flash flooding hotspot, study finds	KOSU	News report

A list of 73 news is at https://nature.altmetric.com/details/126039395/news

Proposal Involvement:

PI1. 2023 Stanford University Human-centered Artificial Intelligence internal funding "Using AI to Uncover Causal Relationships between Floods and Human Health", submitted for $75,000

PI2. 2023 University of Oklahoma ICAST seed funding proposal "Interweaving Hydrology and Indigenous Knowledge for Flood-related Environmental Justice with the Otoe-Missouria Tribe", Co-I, funded $30,000

PI3. 2023 NASA ROSES High Mountain Asia call "High Mountain Andes-Peru: Utilizing NASA Remote Sensing and Hydrological Modeling for Assessment of Water Resource and Cascading Geo-Hazards in Peru", Co-I, submitted.

PI4. 2023 NASA ROSES Soil Moisture Active-Passive Mission Science Team "A Product for Nowcasting and Forecasting SMAP Soil Moisture in Real-Time", Co-I, submitted.

PI5. 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, declined.

PI6. 2022 Oklahoma Water Grant: Delineate floodplain boundaries for tribal Nations in Oklahoma under a warmer climate, Co-PI, declined.

PI7. 2022 NASA ROSES proposal – Environmental and Climate Justice for flood resilience, Invited Collaborator with Prof Yixin Wen (University of Florida), submitted.

PI8. 2022 BIA (Bureau of Indian Affairs) Climate Adaptation to Support Tribal Climate Resilience, Collaborator with Muskogee Nation Environmentalists, declined.

PI9. 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), declined.

PI10. 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), declined.