

Deep Shah, Ph.D.

deep.shah@tamu.edu | +1 979-721-1212 | [Google Scholar](#) | [LinkedIn](#) |

Hydrology | **Remote Sensing** | **Climate Change** | **Drought Monitoring** | **Hydrological Modeling** | **Water Resources Systems**

Education

Ph.D., Civil Engineering , Texas A&M University, USA	2020–2024
GPA: 4.0/4.0; Advisor: Dr. Huilin Gao	
M.Tech., Civil Engineering , Indian Institute of Technology Gandhinagar, India	2017–2019
CPI: 8.71/10; Advisor: Dr. Vimal Mishra	
B.E., Civil Engineering , L.D. College of Engineering, India	2013–2017
CPI: 9.08/10	

Academic Appointments

Postdoctoral Research Associate , University of Colorado Boulder, USA	Apr. 2026–Present
Postdoctoral Researcher , Texas A&M University, USA	Oct. 2024–Apr. 2026
Graduate Research Assistant , Texas A&M University, USA	Sep. 2020–Aug. 2024
Junior Research Fellow , Indian Institute of Technology Gandhinagar, India	Jun. 2019–Aug. 2020

Research Projects

How Do Improvements in Streamflow Forecasts Translate into Better Water Management Decisions in the Colorado River Basin?

Bureau of Reclamation & NOAA

PI: Dr. Balaji Rajagopalan and Dr. Edith Zagana

- Applied the RiverWare modeling framework to evaluate rule-based reservoir operations, water allocation policies, and system-wide management strategies across the Colorado River Basin.
- Utilized the Colorado River Mid-term Modeling System (CRMMS) to perform hindcast and forecast simulations of reservoir operations and pool elevations under alternative streamflow forecast scenarios.

Drought Propagation from Meteorological to Reservoir Droughts at a Global Scale

NASA

PI: Dr. Huilin Gao

- Developed a reservoir-specific drought propagation framework to estimate preparation and response times globally.
- Identified high-risk reservoirs with rapid drought propagation and extended recovery periods, informing mitigation strategies.

NASA's Global Water Reservoir Product Suite

NASA

PI: Dr. Huilin Gao

- Helped generate a comprehensive global reservoir dataset using MODIS and VIIRS satellite observations.
- Evaluated the contribution of surface water storage dynamics to total water storage variability using satellite observations.

PI: Dr. Huilin Gao

- Designed a global reservoir drought monitoring framework by fusing storage and evaporation observations.
- Examined natural climate variability and human influences on long-term freshwater availability.

Drought Onset and Termination in India

Ministry of Water Resources, India

PI: Dr. Vimal Mishra

- Developed an Integrated Drought Index for monitoring meteorological, agricultural, and hydrological droughts.
- Created a drought detection and alert framework to support early warning applications.

Impacts of Climate Change on Water Resources of Sabarmati Basin

Government of India

PI: Dr. Vimal Mishra

- Assessed future water availability and water stress in the Sabarmati River basin using global climate models.
- Quantified potential drivers and uncertainties associated with climate-change impacts on basin-scale water resources.

Honors and Awards

- ❖ Outstanding PhD Dissertation Award, Universities Council on Water Resources, 2026.
- ❖ Distinguished Student Award for Excellence in Research, Association of Former Students, Texas A&M University, 2025.
- ❖ Distinguished Dissertation Award, Texas A&M University, 2025.
- ❖ Third Rank, 3 Minute Thesis Competition, Department of Civil Engineering, Texas A&M University, 2024.
- ❖ First Runner-Up, Texas A&M Institute of Data Science Competition, 2024.
- ❖ Best Progress Award, Texas A&M Institute of Data Science Competition, 2024.
- ❖ Best Supplemental Information Award, Texas A&M Institute of Data Science Competition, 2024.
- ❖ Top Cited Paper of the Year, *Water Resources Research*, 2021–2022.
- ❖ Student Representative, SATMOC Committee, American Meteorological Society, 2022–2024.
- ❖ NASA and CUAHSI Travel Grant, 2022.
- ❖ Excellence Fellowship, Department of Civil and Environmental Engineering, Texas A&M University, 2020–2023.
- ❖ Ministry of Human Resources and Development Scholarship for M.Tech. studies, India, 2017–2019.
- ❖ Director's Fellowship, IIT Gandhinagar, India, 2017–2019.
- ❖ International Travel Grant, IIT Gandhinagar, for European Geosciences Union General Assembly, 2019.
- ❖ Second Rank, Swachh Bharat Internship, India, 2018.
- ❖ United Nations Development Program Travel Grant, Pune, India, 2017.
- ❖ Bronze Medalist, B.E. Civil Engineering, L.D. College of Engineering, India, 2017.

Peer-Reviewed Journal Publications

Citation metrics: **835** citations; h-index: **10**; i10-index: **10** as of June 2026.

1. **Shah, D.**, Mishra, V., & Gao, H. (2026). Global irrigation reservoirs are at a higher risk of water shortages. *Communications Earth & Environment*.
2. **Shah, D.**, & Gao, H. (2025). Global patterns of reservoir fullness and fluctuations during droughts. *Environmental Research Letters*, 20(12), 124060.
3. Zhao, B., Horvat, C., Pearson, C., **Shah, D.**, & Gao, H. (2025). Regional variations in drivers of extreme reference evapotranspiration across the contiguous United States. *Water Resources Research*, 61(10),

4. Huang, C. H., Zhang, S., **Shah, D.**, Yadav, A., Li, Y., Zhao, G., & Gao, H. (2025). 3D-LAKES: Three-Dimensional Global lake and Reservoir Bathymetry from ICESat-2 Altimetry and Landsat Imagery. *Scientific Data*, 12(1), 1625.
5. Román, M., Justice, C., ..., **Shah, D.**, & Gao, H. (2024). Continuity Between NASA MODIS Collection 6.1 and VIIRS Collection 2 Products. *Remote Sensing of Environment*, 302, 113963.
6. **Shah, D.**, Zhang, S., Sarkar, S., Davidson, C., Zhang, R., Zhao, M., ..., & Gao, H. (2024). Transitioning from MODIS to VIIRS Global Water Reservoir Product. *Scientific Data*, 11(1), 209.
7. **Shah, D.**, Zhao, G., Li, Y., Singh, V. P., & Gao, H. (2024). Assessing Global Reservoir-Based Hydrological Droughts by Fusing Storage and Evaporation. *Geophysical Research Letters*, 51(1), e2023GL106159.
8. **Shah, D.**, Shah, H., Dave, H., & Mishra, V. (2021). Contrasting influence of human activities on agricultural and hydrological droughts in India. *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2021.144959>.
9. **Shah, D.**, & Mishra, V. (2021). Strong influence of changes in terrestrial water storage on flood potential in India. *Journal of Geophysical Research: Atmospheres*, e2020JD033566.
10. Li, Y., Zhao, G., **Shah, D.**, Zhao, M., Sarkar, S., Devadiga, S., Zhao, B., Zhang, S., & Gao, H. (2021). NASA's water reservoir product suite from moderate resolution remote sensing data. *Remote Sensing*, 13(4), 565.
11. **Shah, D.**, & Mishra, V. (2020). Integrated Drought Index for drought monitoring and assessment in India. *Water Resources Research*, 56(2), e2019WR026284.
12. **Shah, D.**, & Mishra, V. (2020). Drought onset and termination in India. *Journal of Geophysical Research: Atmospheres*, 125(15), e2020JD032871.
13. Bhardwaj, K., **Shah, D.**, Aadhar, S., & Mishra, V. (2020). Propagation of meteorological to hydrological droughts in India. *Journal of Geophysical Research: Atmospheres*, 125(22), e2020JD033455.
14. Meghwal, R., **Shah, D.**, & Mishra, V. (2019). On the changes in groundwater storage variability in western India using GRACE and well observations. *Remote Sensing in Earth Systems Sciences*, 2(4), 260–272.

Journal Articles in Review and Preparation

1. **Shah, D.**, & Gao, H. Examining the drivers of 4th of July flooding in Texas. In review, *Journal of Hydrology: Regional Studies*.
2. **Shah, D.**, Zhang, S., ..., & Gao, H. The role of global lakes and reservoirs on total water storage. In preparation.
3. **Shah, D.**, & Gao, H. Evaporation to storage ratio is increasing in global reservoirs. In preparation.
4. Zhang, S., **Shah, D.**, ..., & Gao, H. Satellite reveals different features of evaporation between natural lakes and man-made reservoirs. In preparation.
5. Zhang, S., **Shah, D.**, ..., & Gao, H. Remote sensing of temperature profiles for global large lakes via deep learning. In preparation.

Conference Presentations

1. **Shah, D.** & Gao, H. Mapping Reservoir Based Droughts from Space. UCOWR Annual Meeting, 2026
2. Gao, H., **Shah, D.**, Zhang, S., & Huang, C. H. A Global Surface Water Storage Dataset from MODIS: Development and Applications. American Meteorological Society, 2026.
3. **Shah, D.**, Zhang, S., Shukla, S., Fernando, N., Zhu, J., Ma, X., ... & Gao, H. Reservoir Storage Forecasting in the Southern United States Using Machine Learning. American Geophysical Union Fall Meeting, 2025.
4. Zhang, S., **Shah, D.**, Huang, C. H., & Gao, H. Evaluating the Accuracy and Consistency of Satellite-Derived Lake Surface Water Temperature Across Multiple Missions. American Geophysical Union Fall Meeting, 2025.
5. Gao, H., **Shah, D.**, & Zhang, S. Long-term monitoring of global lakes and reservoirs using MODIS/VIIRS observations. American Meteorological Society, 2025.

6. **Shah, D.**, & Gao, H. Reservoirs' behavior and vulnerability during droughts: Impact of locations, sizes, functional uses, and socioeconomic conditions. American Geophysical Union Fall Meeting, 2024.
7. Huang, C., ..., **Shah, D.**, & Gao, H. 3D-LAKES: Three-Dimensional Global Lake and Reservoir Bathymetry from ICESat-2 Altimetry and Landsat Imagery. American Geophysical Union Fall Meeting, 2024.
8. Zhang, S., **Shah, D.**, & Gao, H. Evaluating the contribution of lake evaporation to terrestrial evapotranspiration under drought conditions using MODIS products. American Geophysical Union Fall Meeting, 2024.
9. Gao, H., **Shah, D.**, & Zhang, S. Long-term monitoring of global lakes and reservoirs using MODIS observations. American Geophysical Union Fall Meeting, 2024.
10. Zhang, S., **Shah, D.**, Zhao, B., & Gao, H. Remote sensing of temperature profiles for global large lakes via deep learning. Association for the Science of Limnology and Oceanography Annual Meeting, 2024.
11. **Shah, D.**, Mishra, V., & Gao, H. A global evaluation of the propagation from meteorological to reservoir-based hydrological droughts. American Geophysical Union Fall Meeting, 2023.
12. Zhang, S., **Shah, D.**, Zhao, B., & Gao, H. Remote sensing of vertical temperature profiles in global large lakes. American Geophysical Union Fall Meeting, 2023.
13. Gao, H., **Shah, D.**, ..., & Justice, C. Transitioning from NASA's MODIS to VIIRS Global Water Reservoir Products: A perspective of continuity. American Geophysical Union Fall Meeting, 2023.
14. **Shah, D.**, Zhao, G., Li, Y., Huang, C., Zhang, S., & Gao, H. Estimating storage and evaporation dynamics for large global lakes. American Geophysical Union Fall Meeting, 2022.
15. **Shah, D.**, Zhao, G., Li, Y., & Gao, H. Do human activities influence reservoir-based hydrological droughts? European Geosciences Union General Assembly, 2022.
16. Gao, H., Zhao, G., Li, Y., Allen, G. H., Zhou, L., & **Shah, D.** Human influence on global surface water observed by satellites. American Geophysical Union Fall Meeting, 2022.
17. Gao, H., Zhang, S., **Shah, D.**, Zhao, G., Sarkar, S., Davidson, C. C., Zhang, R., & Devadiga, S. Developing and validating the SNPP/JPSS VIIRS Global Water Reservoir Product. American Geophysical Union Fall Meeting, 2022.
18. Zhang, S., Zhao, G., Zhao, B., **Shah, D.**, & Gao, H. Developing long-term global lake evaporation and temperature profile records using MODIS observations. American Geophysical Union Fall Meeting, 2022.
19. **Shah, D.**, Zhao, G., Li, Y., & Gao, H. Monitoring hydrological droughts using a new remotely sensed Global Reservoir Product. American Geophysical Union Fall Meeting, 2021.
20. Gao, H., Li, Y., **Shah, D.**, ..., & Zhang, S. NASA's new MODIS/VIIRS Global Water Reservoir Product Suite. American Geophysical Union Fall Meeting, 2021.
21. Li, Y., **Shah, D.**, Zhao, G., & Gao, H. Estimating groundwater storage variations from GRACE by incorporating a global reservoir storage dataset. American Geophysical Union Fall Meeting, 2021.
22. **Shah, D.**, & Mishra, V. Impact of groundwater pumping on flood potential in Indian sub-continental river basins. European Geosciences Union General Assembly, 2020.
23. **Shah, D.**, & Mishra, V. Integrated Drought Index to monitor drought severity in western India. European Geosciences Union General Assembly, 2019.

Technical Reports

1. Zhang, S., **Shah, D.**, & Gao, H. (2023). Collection 2 VIIRS Reservoir Product Algorithm Theoretical Basis Document. NASA, USA.
2. Zhao, G., Li, Y., Zhang, S., **Shah, D.**, & Gao, H. (2021). Collection 6.1 MODIS Reservoir Product Algorithm Theoretical Basis Document. NASA, USA.
3. Mishra, V., **Shah, D.**, & Shah, H. (2019). Impacts of Climate Change and Climate Variability on Water Resources of Sabarmati River Basin. Ministry of Water Resources, India.

Research Products and Media Highlights

- ▶ Helped develop a reservoir operational product for water managers, researchers, and policymakers to visualize and download data: [NASA Global Water Reservoir Product Suite](#).
- ▶ Media highlight: [Toward Continuous Reservoir Monitoring from Space](#).
- ▶ Department media highlight: [Texas A&M Engineering LinkedIn feature](#).
- ▶ Media coverage: [India's groundwater crisis in the west](#).

Teaching and Mentoring

Guest Lecture, CEES5903: Remote Sensing Hydrology, University of Oklahoma Spring 2026

- Designed and delivered a guest lecture on remote sensing of surface water for undergraduate and graduate students.
- Introduced key principles and applications of satellite remote sensing for monitoring lakes, reservoirs, and water resources.
- Explained methodologies for tracking reservoir dynamics, water extent, storage variations, and drought impacts using Earth observation data.

Teaching Assistant, Remote Sensing in Hydrology, Texas A&M University Spring 2023

- Helped redesign laboratory assignments to integrate recent datasets and real-world hydrological events.
- Supported students with assignments and assisted in developing mid-term and final examination materials.

Co-Instructor, Short Course on Monitoring Global Lakes and Reservoirs Using Multi-Satellite Observations, American Meteorological Society Spring 2024

- Demonstrated how to access, visualize, and apply remote sensing datasets for surface water monitoring.
- Guided hands-on Google Earth Engine exercises, including app development and interactive mapping.
- Supported more than 100 participants from 50+ countries through live troubleshooting and technical discussion.

Teaching Assistant, CE 309: Field Survey, IIT Gandhinagar Spring 2019

- Assisted students in understanding surveying instruments through hands-on demonstrations and assignment support.

Mentoring

- Mentored two M.S. students with thesis research at Texas A&M University, 2023–2025.
- Guided two M.S. students on research paper writing and development at IIT Gandhinagar, 2019–2020.
- Provided laboratory support for Advanced Engineering Hydrology and Remote Sensing of Land and Water Resources at IIT Gandhinagar, 2019–2020.

Proposal Experience

NASA Proposals for Long-Term Monitoring of Lakes and Reservoirs

Assisted PI Dr. Huilin Gao on three successfully funded NASA proposals focused on continuous monitoring of lakes and reservoirs using MODIS and VIIRS observations:

- Algorithm Maintenance for the MODIS Global Water Reservoir Product.
- NASA's SNPP and JPSS Global Water Reservoir Product Suite.
- Understanding the Long-Term Dynamics of Global Lake/Reservoir Storage and Evaporation using TERRA/AQUA/SNPP/JPSS Satellite Observations.

Professional Activities and Service

Scientific Sessions Facilitated

- Chair, “Remote Sensing of Water Resources,” American Geophysical Union Fall Meeting, 2023.
- Co-Convener, “Monitoring Global Lakes and Reservoirs Using Multi-Satellite Observations,” American Meteorological Society, 2023.

Workshop Organization

- Planning Committee Member, 2024 AMS SatMOC Virtual Short Course on Monitoring El Nino Southern Oscillation and its Community Impacts.
- Planning Committee Member, 2023 AMS SatMOC Virtual Short Course on Satellite Enterprise: Applications and Opportunities.
- Planning Committee Member, 26th Conference on Satellite Meteorology, Oceanography, and Climatology, AMS Annual Meeting, 2024.
- Planning Committee Member, 20th Annual Symposium on Operational Environmental Satellite Systems, AMS Annual Meeting, 2024.

Invited Talks

- “Mapping reservoir-based droughts from space”, CADSWES, University of Colorado Boulder, 2026
- “Monitoring reservoirs from space,” Lehner Committee chaired by Dr. Vijay P. Singh, Texas A&M University, 2024.
- “New perspective for monitoring hydrological droughts considering reservoir dynamics,” Department of Civil and Environmental Engineering, Texas A&M University, 2022.

Leadership

Student Member, Committee on Satellite Meteorology, Oceanography, and Climatology, 2023–2025.

- Student Representative/Member, Remote Sensing Technical Committee, American Geophysical Union, 2023–Present.
- Director of Finance, Indian Graduate Students’ Organization, Texas A&M University, 2021–2023.
- Discipline Coordinator, Department of Civil Engineering, IIT Gandhinagar, 2017–2018.
- Manager of Tech-Fest, Gujarat Technological University, 2016–2017.

Peer Review Service

- Reviewed 25+ articles for journals including *Geophysical Research Letters*, *Journal of Hydrology*, *Environmental Research: Climate*, *Scientific Data*, *Earth’s Future*, and *Journal of Geophysical Research: Atmospheres*.
- Verified reviews: [ORCID profile](#).

Technical Skills

Programming and analysis: Python, MATLAB, R, Google Earth Engine, CDO, GMT, LaTeX.

Geospatial and remote sensing: ArcGIS, ENVI, MODIS, VIIRS, GRACE

Modeling: RiverWare, VIC, VIC-SIMGM, SWAT

Professional skills: Public speaking, mentoring, adaptive thinking, problem solving, scientific writing, interdisciplinary collaboration.

Professional Affiliations

American Geophysical Union (AGU); American Meteorological Society (AMS); European Geosciences Union (EGU)