

# Manabendra Saharia

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## Current Affiliation and Address

Assistant Professor  
V-318, Department of Civil Engineering  
Indian Institute of Technology Delhi  
Hauz Khas, Delhi 110016, India

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**Research Group:** <https://hydrosenselab.github.io/>

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## Research Bio

I develop techniques and systems for monitoring and mitigating natural hazards such as floods and droughts, with a special focus on the worst-affected regions of the world. My research seeks to simulate and understand the various aspects of the water cycle using data-driven and physics-based models.

## Research Interests

Flood and drought forecasting, land surface modeling, radar and satellite precipitation, statistics, and machine Learning, crowdsourcing.

## Professional Experience

- 2019-Present **Assistant Professor**, *Dept. of Civil Engineering*, Indian Institute of Technology Delhi.
- 2019 **Postdoctoral Research Associate**, NASA Goddard Space Flight Center, USA.
  - A West Africa Land Data Assimilation System for Forecasting Extreme Hydrological Events
- 2017–2018 **Postdoctoral Researcher**, National Center for Atmospheric Research, Colorado, USA.
  - Developing a real-time and distributed HUC-based modeling system for ensemble streamflow forecasting over large domains.
  - Uncertainty quantification and sensitivity analysis of flood frequency estimates.
- 2013–2017 **Graduate Research Assistant**, *Advanced Radar Research Center*, US National Weather Center/The University of Oklahoma.
- 2011–2013 **Graduate Research Assistant**, *HWRL*, University of Texas at Arlington.

## Education

- 2013–2017 **Ph.D. in Water Resources Engineering**, *University of Oklahoma*, Norman, OK.
  - **Dissertation:** Characterization and Prediction of Flash Flood Severity.
- 2011–2013 **M.S. in Water Resources Engineering**, *University of Texas at Arlington*, Arlington, TX.
  - **Thesis:** Ensemble Streamflow Forecasting For The Upper Trinity River Basin In Texas
- 2007–2011 **B.Tech. in Civil Engineering**, *National Institute of Technology, Silchar*, Assam, India.
  - **Major Project:** Flood Forecasting in Multiple River Sections using Artificial Neural Networks

## In-progress Journal Publications

1. **Saharia, M.**, Avish Jain, Ronit Raj Baishya, Saagar Haobam, Sreejith OP, DS Pai, Arezoo Rafieenasab, "India Flood Inventory: Creation of a multi-source national geospatial database to facilitate comprehensive flood research", 2020, EarthArXiv, <https://doi.org/10.31223/X5XS3V>, [Under review]
2. Dhiraj Saharia, Shilpa Manandhar, Yee Hui Lee, Stefan Winkler, Soumyabrata Dev, and **Manabendra Saharia**, "Precipitation Estimates from Satellite and Ground-based Sensors" , 2020. [Under review]
3. **Saharia, M.**, Kirstetter, P.E., Vergara, H., Gourley, J.J., Hong, Y., "Impact of rainfall spatial variability on flash flood severity", 2020. [Under review]
4. Kiran, S. K. **Saharia, M.**, Kirstetter, P.E., "Characterization of Floods at a Global Scale", 2020. [Under review]

## Journal Publications

1. Sunghee Kim, Sadeghi, H., Limon, R.A., **Saharia, M.**, Seo, D.J., Philpott, A., Bell, F., Brown, J., He, K., 2018 "Assessing the Skill of Medium-Range Ensemble Precipitation and Streamflow Forecasts from the Hydrologic Ensemble Forecast Service (HEFS) for the Upper Trinity River Basin in North Texas", Journal of Hydrometeorology, 19, 1467–1483
2. **Saharia, M.**, Kirstetter, P.E., Vergara, H., Gourley, J.J., Hong, Y., 2017. "Characterization of Floods in the United States", Journal of Hydrology 548, 524–535.
3. **Saharia, M.**, Kirstetter, P.E., Vergara, H., Gourley, J.J., Hong, Y., Giroud, M., 2017. "Mapping Flash Flood Severity in the United States", Journal of Hydrometeorology, 18, 397–411.
4. Li, W., Liu, C., Hong, Y., Zhang, X., Wan, Z., **Saharia, M.**, Sun, W., Yao, D., Chen, W., Chen, S., others, 2016. "A public Cloud-based China's Landslide Inventory Database (CsLID): development, zone, and spatiotemporal analysis for significant historical events, 1949-2011", Journal of Mountain Science 13, 1275–1285.
5. Li, W., Liu, C., Hong, Y., **Saharia, M.**, Sun, W., Yao, D., Chen, W., 2016. "Rainstorm-induced shallow landslides process and evaluation—a case study from three hot spots, China", Geomatics, Natural Hazards and Risk, 1–11.
6. Zhang, Y., Hong, Y., Wang, X., Gourley, J.J., Xue, X., **Saharia, M.**, Ni, G., Wang, G., Huang, Y., Chen, S., others, 2014. "Hydrometeorological Analysis and Remote Sensing of Extremes: Was the July 2012 Beijing Flood Event Detectable and Predictable by Global Satellite Observing and Global Weather Modeling Systems?", Journal of Hydrometeorology.
7. Shen, Y., Xiong, A., Hong, Y., Yu, J., Pan, Y., Chen, Z., **Saharia, M.**, 2014. "Uncertainty analysis of five satellite-based precipitation products and evaluation of three optimally merged multi-algorithm products over the Tibetan Plateau", International Journal of Remote Sensing 35, 6843–6858.
8. Roy, P., **Saharia, M.**, Choudhury, P., 2014. River Reaches Flood Flow Prediction using PRNN Models. International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD) 1, 119–126.
9. **Saharia, M.**, Bhattacharjya, R.K., 2012. "Geomorphology-based time-lagged recurrent neural networks for runoff forecasting", KSCE Journal of Civil Engineering 16, 862–869.
10. Jain, S.K., Kumar, V., **Saharia, M.**, 2012. "Analysis of Rainfall and Temperature trends in North-East India", International Journal of Climatology.

## Book Chapters

1. **Saharia, M.**, Li, L., Hong, Y., Wang, J., Adler, R. F., Policelli, F. S., Shahid, H., Irwn, D., Korme, T., and Okello, L. (2016). "Real-time hydrologic prediction system in East Africa through SERVIR", Hydrologic Remote Sensing - Capacity Building for Sustainability and Resilience, CRC Press, Taylor and Francis Group.
2. Shen, Y., Anyuan, X., Hong, Y., Jingjing, Y., Yang, P., Zhuoqi, C., and **Saharia, M.** (2016). "Uncertainty Analysis of Five Satellite-Based Precipitation Products and Evaluation of Three Optimally

Merged Multi-algorithm Products over the Tibetan Plateau", Hydrologic Remote Sensing - Capacity Building for Sustainability and Resilience, CRC Press, Taylor and Francis Group.

## Grants and Fellowships

As Principal Investigator (PI)				
Funding Agency	Project Title	Amount	Duration	Awarded
UCL-IITD Strategic Partner Fund	Making local knowledge matter for landslides and flooding preparedness	Rs 5,00,000	1 year	2020
Principal Scientific Adviser to the Govt. of India	Developing a real-time localized flood awareness system for National Capital Region (NCR) using citizen science and satellite remote sensing	Rs 11,00,000	1 year	2020
High Performance Computing, IIT Delhi	Establishing an LDAS over India	Rs 50,000	1 year	2020
IRD, IIT Delhi	New Faculty Grant	Rs 100,000		2019
IIT Delhi	Young Faculty Incentive Fellowship	Rs 25,000 p.m.	3 years	2019
National Center for Atmospheric Research (NCAR) USA	Early Career Scientist Assembly (ECSA) Award	\$2000		2018

## Invited Talks [Technical]

- 15 July 2020 "Role of Machine Learning in Civil Engineering", Faculty Development Program, Jorhat Engineering College, Assam.
- 20 Nov 2019 "Flood Defense - Plausible solutions rather than possible", *Transforming NE region through Science and Technology Interventions*, Assam Administrative Staff College, Guwahati.
- 15 Nov 2019 "A Water Alliance for Tomorrow", *River-research to Evolve Sustainable-projects for People with Eco-friendly Climate-resilient Technology (RESPECT)*, IIT Guwahati.

## Awards and Mentions

- Mar 2017 Citation and cash award in the oral presentation category of the Student Water Conference, Oklahoma Water Resources Center, Mar 23, 2017.
- Mar 2017 Advanced Radar Research Center Student Paper Cash Award *in recognition of research accomplishments and scholarly publication*
- Feb 2017 First prize and cash award in the oral presentation category of the Student Research and Creativity Day, University of Oklahoma, Feb 24, 2017.
- Jan 2017 Advanced Radar Research Center Student Paper Cash Award *in recognition of research accomplishments and scholarly publication*
- Mar 2016 First prize and cash award in the oral presentation category of the Student Research and Creativity Day, University of Oklahoma, March 4, 2016.
- Oct 2015 Student Recognition, President's Monthly Research and Development Highlights, Volume 10, Issue 7, University of Oklahoma
- Oct 2015 Best Poster Award in the Graduate Student Poster Contest, Annual Meeting of the Society of Environmental Journalists (SEJ), Norman, October 7-11, 2015

## Conference Presentations

(This list is no longer updated)

1. Newman, A.J., **Saharia, M.**, Stone, A., Holmes, K. (2019) "Understanding uncertainty contributions throughout the hydrologic modeling system in stochastic flood frequency analysis", AMS Annual Meeting, Phoenix, USA.
2. Wood, A.W., **Saharia, M.**, Clark E., Clark, M., Nijssen, B., (2019) "Application of an Ensemble Modeling Approach for Assimilating Observations to Improve Hydrologic and Streamflow Predictions", AMS Annual Meeting, Phoenix, USA.
3. **Saharia, M.**, Newman, A.J., Stone, A., Holmes, K. (2018) "Identifying potentially neglected sources of uncertainty in flood frequency estimation using a multi-model framework", AGU Annual Meeting 2018, Washington DC. **[Selected for Oral]**
4. Wood, A.W., Clark E., **Saharia, M.**, Clark, M., Nijssen, B., (2018) "Application of an ensemble-based modeling approach for assimilating observations to improve hydrologic and streamflow predictions", AGU Annual Meeting 2018, Washington DC. **[Oral]**
5. Wood, A.W., **Saharia, M.**, Clark, M., Bennett, A., Nijssen, B., Clark, E., Newman, A. (2018) "Development and Demonstration of Ensemble Hydrologic Data Assimilation Strategies for a Real-Time Distributed Regional Hydrologic Forecast System", AMS Annual Meeting 2018, Austin, Texas. **[Oral]**
6. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y (2018) "Accounting for rainfall spatial variability in the prediction of flash floods", AMS Annual Meeting 2018, Austin, Texas. **[Poster]**
7. **Saharia, M.**, Wood, A.W., Clark, M., Bennett, A., Nijssen, B., Clark, E., Newman, A. (2017) "Distributed HUC-based modeling with SUMMA for ensemble streamflow forecasting over large regional domains", AGU Annual Meeting 2017 **[Poster]**
8. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2017) "Impact of Rainfall Spatial Variability on Flash Flood Severity", Student Water Conference, Oklahoma Water Resources Center, Mar 23-24, Oklahoma. **[Oral presentation award]**
9. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2017) "Impact of Rainfall Spatial Variability on Flash Flood Severity", EGU General Assembly, Apr 23-28, Austria. **[Oral]**
10. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2017) "How can we measure the severity of flash floods?", Research and Creativity Day, Feb 24, University of Oklahoma. **[Best Oral Presentation award]**
11. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2016) "Accounting for Rainfall Spatial Variability in Prediction of Flash Floods", AGU Fall Meeting, Dec 12-16, San Francisco. **[Oral]**
12. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2016) "Accounting for Rainfall Spatial Variability in Prediction of Flash Floods", 9th European Conference on Radar in Meteorology, Oct 10, Turkey. **[Oral]**
13. Hong, Y., Gourley, JJ., **Saharia, M.**, Flamig, Z., Clark, R., Zhang, K., Muthike, D., Denus., Hasan, Emad., Cappelaere, P., Frye, S., Handy, M., Nyaga, J. (2016) "Forecasting and Communicating Water-Related Disasters in Africa", SAGE, Nepal. **[Poster]**
14. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2016) "Mapping the flashiest regions of the United States", Research and Creativity Day, Mar 4 University of Oklahoma. **[Best Oral Presentation award]**
15. Kirstetter, PE., **Saharia, M.**, Gourley, JJ., Vergara, H. and Hong, Y. (2016) "Toward estimating the probability of flood severity over the United States", AMS Annual Meeting, 2016, New Orleans. **[Oral]**
16. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2015) "Mapping Flash Flood Severity in the United States", AGU Fall Meeting, Dec 14-18, San Francisco, California. **[Oral]**
17. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2015) "Where are the flashiest basins of the United States?", Annual Meeting of the Society of Environmental Journalists (SEJ), Oct 7-11, Norman, Oklahoma. **[Poster] [Best Poster Award]**

18. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2015) "Characterization and Prediction of Flash Flood Severity in the United States", 2015 International Symposium on Earth-Science Challenges, Sep 20-23, Norman, Oklahoma. **[Oral]**
19. **Saharia, M.**, Kirstetter, PE, Gourley, JJ., Vergara, H. and Hong, Y. (2014) "Characterization of Floods in the United States", AGU Fall Meeting, Dec 15-19, San Francisco, California. [Poster]
20. **Saharia, M.**, Seo., Dong-Jun, Corby, R. and He, K. (2013) "Short-range ensemble streamflow forecasting of the Upper Trinity River – Evaluation via hindcasting experiments", AGU Meeting of the Americas, May 14-17, Cancun, Mexico. **[Oral]**
21. **Saharia, M.**, Seo., Dong-Jun, Corby, R. and Bell, F. (2013) "Increasing lead time in short-range streamflow forecasting via the Hydrologic Ensemble Forecast Service (HEFS)", NWS/OHD Seminar, Silver Spring, MD.
22. **Saharia, M.**, Bhattacharjya, R. K. and Satish, M. (2011) "Catchment Runoff Forecasting using Time-Lagged Recurrent Neural Networks". 4th ASCE-EWRI International Perspective on Water Resources & the Environment (IPWE 2011), January 4-6, National University of Singapore, Singapore.
23. Roy, P., Choudhury, P. and **Saharia, M.** (2011). "River Reaches Flood Flow Prediction using TLRN models". 4th ASCE-EWRI International Perspective on Water Resources & the Environment (IPWE 2011), January 4-6, National University of Singapore, Singapore.
24. **Saharia, M.** and Bhattacharjya, R. K. (2011). "Comparison of ANN-based Runoff-prediction Models Trained by Eight Different Learning Algorithms". 4th ASCE-EWRI International Perspective on Water Resources & the Environment (IPWE 2011), January 4-6, National University of Singapore, Singapore.
25. Roy, P., Choudhury, P. and **Saharia, M.** (2010). "Dynamic ANN Modeling for Flood Forecasting in a River Network". International Conference on Modeling, Optimization and Computing (ICMOC 2010), American Institute of Physics Conf. Proc., NIT Durgapur, India.

## Teaching Experience

- Instructor, CVL 282 Engineering Hydrology, IIT Delhi, 2019-20, 2020-21
- Instructor, CVL 381 Design of Hydraulic Structures, IIT Delhi, 2019-20
- Instructor, CVP 731 Simulation Lab II, IIT Delhi, 2019-20
- Instructor, CVP 731 NEN 100 Professional Ethics and Social Responsibility, IIT Delhi, 2019-20
- Teaching Assistant and co-taught, CEES 5843 Hydrology - Co-taught and organized lecture series, University of Oklahoma, Spring 2017
- Teaching Assistant, CEES 5903 Remote Sensing Hydrology, University of Oklahoma, Spring 2016

## Ongoing Thesis Supervision

### Ph.D.

- Ravi Raj [2019-]
- Sai Kiran Kuntla [2020-]
- Bhanu Magotra [2020-]
- Anagha P. [2020-]
- Nirdesh Sharma [2020-]

### M.Tech.

- Khusboo Alvi [2020-21]

### B.Tech.

- Jatin Ahuja [2020-21]

- Yash Gupta [2020-21]
- Gautam Kunwar [2020-21]

## Academic Service

### Conferences

- 2020 Technical Committee, International Conference on Sustainable Water Resources Management (SWARM), Guwahati
- 2019 Conference Co-Chair, Computer Vision for Atmospheric Events Analysis (CVAE), ACPR 2019 Workshop, Auckland, New Zealand

### Reviewer

- Journal of Hydrology
- Water Resources Research
- Journal of Hydrometeorology
- Journal of Flood Risk Management

## Administrative Experience

### Institute Level, IIT Delhi

- 2019-20 Institute Representative, JEE (Joint Entrance Examination) Advanced, IIT Delhi
- 2019-20 Institute Representative, GATE (Graduate Aptitude Test in Engineering), IIT Delhi

### Department Level, Department of Civil Engineering, IIT Delhi

2020-21

- Water Resources Simulation Laboratory I/C (Jointly)
- CVN 101 Intro to Civil Engineering (Coordinator)
- CVQ 301 Civil Engineering Seminar (Co-Coordinator)
- NEN 101 Professional Ethics and Social Responsibility (Department Volunteer)

- 2020-21 B.Tech. Report Evaluation Committee (Jointly)

## Popular Writing

1. **Saharia, Manabendra** "Can a Sanctuary in Brahmaputra Save River Dolphins?", Nov 29, 2016. The Assam Tribune (Lead editorial)
2. **Saharia, Manabendra** "An ASEAN university in North-East", Mar 8, 2016. The Assam Tribune (Editorial)

## Professional Memberships

- American Geophysical Union
- American Meteorological Society
- American Society of Civil Engineers

## Workshops Participated

- Oct 2019 River-research to Evolve Sustainable-Projects for People with Eco-friendly Climate-resilient Technology (RESPECT), IIT Guwahati
- Sep 2017 The 2016 Multi-Radar/Multi-Sensor (MRMS) HMT-Hydro Testbed Experiment (Served as Coordinator)

May-Jul 2015 National Flood Interoperability Experiment, Summer Institute, National Water Center,  
Tuscaloosa, Alabama (8 Weeks)  
Jan 2011 HEPEX Workshop, National Weather Center, Silver Spring, Maryland (3 days)

## Personal Interests

Educational outreach, mentoring, volunteering, writing columns, Fitness