

Manabendra Saharia

🔍 Google Scholar | [®] ResearchGate | 🏠 Github | in LinkedIn | 🐦 Twitter

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Address and Contact Information

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Research Bio

My goal is to develop solutions for reducing the impact of natural hazards and sustainably managing our water resources. For this, I simulate and investigate the terrestrial hydrological cycle using physics-based and data-driven models. Current focus is to develop techniques for monitoring and mitigating floods and droughts, specially for the worst-affected regions of the world.

Research Interests

Land surface modeling, AI/ML applications, Hydrometeorology, flood forecasting, radar and satellite precipitation, crowdsourcing.

Experience

- 2019-now **Assistant Professor**, Dept. of Civil Engineering & Yardi School of Artificial Intelligence (Associate Appt.), 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
- 2017-18 **Postdoctoral Fellow**, 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.
- 2013-17 **Graduate Research Assistant**, Advanced Radar Research Center, US National Weather Center/The University of Oklahoma.
- 2011-13 **Graduate Research Assistant**, HWRL, University of Texas at Arlington.

Education

- 2013-17 **Ph.D. in Water Resources Engineering**, *University of Oklahoma*, Oklahoma, USA.
- **Dissertation:** Characterization and Prediction of Flash Flood Severity.
- 2011-13 **M.S. in Water Resources Engineering**, *University of Texas at Arlington*, Texas, USA.
- **Thesis:** Ensemble Streamflow Forecasting For The Upper Trinity River Basin In Texas
- 2007-11 **B.Tech. in Civil Engineering**, *National Institute of Technology, Silchar*, Assam, India.
- **Major Project:** Flood Forecasting in Multiple River Sections using Artificial Neural Networks

Grants and Fellowships

Here, PI - Principal Investigator

Funding Agency	Project Title	PI/ Co-PI	Amount	Duration
IIT Delhi Seed Grant	Development of an Interpretable Machine Learning Framework for Detection and Attribution of Hydroclimatic Extremes	PI	Rs 20 Lakhs	2021-2023
Principal Scientific Adviser to the Government of India	Portable and High Precision Compact Gravimeter for Field Applications	Co-PI	Rs 10 crores	2021-2026
Indian Space Research Organization (ISRO)	Establishing a coupled Indian Land Data Assimilation System (ILDAS) for identifying hydrologic extremes	PI	Rs 35 Lakhs	2021-2024
UCL-IITD Strategic Partner Fund	Making local knowledge matter for landslides and flooding preparedness	PI	Rs 5 Lakhs	2020-21
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	PI	Rs 11 Lakhs	2020-21
High Performance Computing, IIT Delhi	Establishing an LDAS over India	PI	Rs 50 thousand	2020
IRD, IIT Delhi	New Faculty Grant	PI	Rs 1 Lakh	2019
IIT Delhi	Young Faculty Incentive Fellowship	Fellow	Rs 25,000 p.m.	2019
National Center for Atmospheric Research (NCAR), USA	Early Career Scientist Assembly (ECSA) Award	PI	\$2000	2018

Publications [Under Review]

1. Raj, Ravi et al., 2022, "High-resolution Soil Erodibility Map of India".
2. Kuntla, Sai Kiran et al., 2022 "Global-Scale Catchment Characterization of Streamflow Extremes".
3. Sarma, S. et al., 2022 "Towards an Interpretable Machine Learning model for electrospun polyvinylidene fluoride (PVDF) fiber properties"
4. Saharia, D. et al., 2021 "The Reliability of Satellite Precipitation Measurements in Singapore".
5. Kumari, S. et al., 2021 "COVID-19 Lockdown: An Unwanted, Unprecedented Way to Address Air Pollution".

Journal Publications

- 2022 Ravi Raj, **Saharia, Manabendra**, Sumedha Chakma, and Arezoo Rafieinasab. Mapping rainfall erosivity over india using multiple precipitation datasets. volume 214, page 106256, 2022. [doi:10.1016/j.catena.2022.106256](https://doi.org/10.1016/j.catena.2022.106256).
- 2021 **Saharia, Manabendra**, Pierre-Emmanuel Kirstetter, Humberto Vergara, Jonathan J. Gourley, Isabelle Emmanuel, and Hervé Andrieu. On the Impact of Rainfall Spatial Variability, Geomorphology, and Climatology on Flash Floods. *Water Resources Research*, volume n/a, page e2020WR029124, 2021. [doi:10.1029/2020WR029124](https://doi.org/10.1029/2020WR029124). [_eprint: https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2020WR029124](https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2020WR029124).

- 2021 **Saharia, Manabendra**, Avish Jain, Ronit Raj Baishya, Saagar Haobam, O. P. Sreejith, D. S. Pai, and Arezoo Rafieeinasab. India flood inventory: creation of a multi-source national geospatial database to facilitate comprehensive flood research. *Natural Hazards*, March 2021. doi10.1007/s11069-021-04698-6.
- 2021 Akhil Sanjay Potdar, Pierre-Emmanuel Kirstetter, Devon Woods, and **Saharia, Manabendra**. Towards Predicting Flood Event Peak Discharge in Ungauged Basins by Learning Universal Hydrological Behaviors with Machine Learning. *Journal of Hydrometeorology*, volume -1, August 2021. doi10.1175/JHM-D-20-0302.1. Publisher: American Meteorological Society Section: Journal of Hydrometeorology.
- 2021 A. J. Newman, A. G. Stone, **Saharia, M.**, K. D. Holman, N. Addor, and M. P. Clark. Identifying sensitivities in flood frequency analyses using a stochastic hydrologic modeling system. *Hydrology and Earth System Sciences*, volume 25, pages 5603–5621, 2021. doi10.5194/hess-25-5603-2021.
- 2018 Sunghee Kim, Hossein Sadeghi, Reza Ahmad Limon, **Saharia, Manabendra**, Dong-Jun Seo, Andrew Philpott, Frank Bell, James Brown, and Minxue He. 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*, August 2018. doi10.1175/JHM-D-18-0027.1.
- 2017 **Saharia, Manabendra**, Pierre-Emmanuel Kirstetter, Humberto Vergara, Jonathan J. Gourley, Yang Hong, and Marine Giroud. Mapping Flash Flood Severity in the United States. *Journal of Hydrometeorology*, volume 18, pages 397–411, February 2017. doi10.1175/JHM-D-16-0082.1. Publisher: American Meteorological Society Section: Journal of Hydrometeorology.
- 2017 **Saharia, Manabendra**, Pierre-Emmanuel Kirstetter, Humberto Vergara, Jonathan J. Gourley, and Yang Hong. Characterization of floods in the United States. *Journal of Hydrology*, volume 548, pages 524–535, May 2017. doi10.1016/j.jhydrol.2017.03.010.
- 2016 Weiyue Li, Chun Liu, Yang Hong, **Saharia, Manabendra**, Weiwei Sun, Dongjing Yao, and Wen Chen. Rainstorm-induced shallow landslides process and evaluation – a case study from three hot spots, China. *Geomatics, Natural Hazards and Risk*, volume 7, pages 1908–1918, November 2016. doi10.1080/19475705.2016.1179685.
- 2016 Wei-yue Li, Chun Liu, Yang Hong, Xin-hua Zhang, Zhan-ming Wan, **Saharia, Manabendra**, Weiwei Sun, Dong-jing Yao, Wen Chen, Sheng Chen, Xiu-qin Yang, and Yue Yue. 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*, volume 13, pages 1275–1285, July 2016. doi10.1007/s11629-015-3659-7.
- 2014 Yu Zhang, Yang Hong, Xuguang Wang, Jonathan J. Gourley, Xianwu Xue, **Saharia, Manabendra**, Guangheng Ni, Gaili Wang, Yong Huang, Sheng Chen, and Guoqiang Tang. 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*, volume 16, pages 381–395, October 2014. doi10.1175/JHM-D-14-0048.1.
- 2014 Yan Shen, Anyuan Xiong, Yang Hong, Jingjing Yu, Yang Pan, Zhuoqi Chen, and **Saharia, Manabendra**. 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*, volume 35, pages 6843–6858, 2014.
- 2014 Parthajit Roy, **Saharia, Manabendra**, and P. Choudhury. River Reaches Flood Flow Prediction using PRNN Models. *International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD)*, volume 1, pages 119–126, 2014.

- 2013 S. K. Jain, Vijay Kumar, and **Saharia, M.** Analysis of rainfall and temperature trends in northeast India. *International Journal of Climatology*, volume 33, pages 968–978, 2013. [doi:https://doi.org/10.1002/joc.3483](https://doi.org/10.1002/joc.3483). [_eprint:https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/joc.3483](https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/joc.3483).
- 2012 **Saharia, Manabendra** and Rajib Kumar Bhattacharjya. Geomorphology-based Time-Lagged Recurrent Neural Networks for runoff forecasting. *KSCE Journal of Civil Engineering*, volume 16, pages 862–869, July 2012. [doi:10.1007/s12205-012-1463-2](https://doi.org/10.1007/s12205-012-1463-2).

Book Chapters

- 2016 **Saharia, Manabendra**, Li Li, Yang Hong, Jiahu Wang, Robert Adler, Fritz Policelli, Shahid Habib, D. Irwin, Tesfaye Korme, and Lawrence Okello. Real-Time Hydrologic Prediction System in East Africa through SERVIR: Capacity Building for Sustainability and Resilience. pages 247–258. October 2016.
- 2016 Yan Shen, Anyuan Xiong, Yang Hong, Jingjing Yu, Yang Pan, Zhuoqi Chen, and **Saharia, Manabendra**. Uncertainty Analysis of Five Satellite-Based Precipitation Products and Evaluation of Three Optimally Merged Multialgorithm Products over the Tibetan Plateau: Capacity Building for Sustainability and Resilience. pages 215–232. October 2016.

Awards and Mentions

- Nov 2021 French Embassy's Faculty Mobility Initiative Award, Sponsored Research Visit to IFSTAAR/University of Eiffel, Nov 2021
- Oct 2019 Young Faculty Incentive Fellowship, 2019-2022, IIT Delhi
- 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.
- 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

Teaching Experience

- Instructor, CVP735 Finite Element Methods, IIT Delhi, 2022
- Instructor, CVL834 Urban Water Infrastructure, IIT Delhi, 2021
- Instructor, CVL282 Engineering Hydrology, IIT Delhi, 2020, 21
- Instructor, CVL381 Design of Hydraulic Structures, IIT Delhi, 2019, 2020
- Instructor, CVP731 Simulation Lab II, IIT Delhi, 2019, 20, 21
- Instructor, CVP731 Simulation Lab I, IIT Delhi, 2021, 2022
- Instructor, CVP731 NEN 100 Professional Ethics and Social Responsibility, IIT Delhi, 2019
- Teaching Assistant and co-taught, CEES 5843 Hydrology, University of Oklahoma, Spring 2017
- Teaching Assistant, CEES 5903 Remote Sensing Hydrology, University of Oklahoma, Spring 2016

Thesis Supervision

Graduated from IIT Delhi - 2 Masters

Ph.D. Scholar	Title	Year
Ved Prakash	Indian Land Data Assimilation System	2022-
Prateek Sharma	Gravimetry	2022-
Anagha P.	Deep Learning Applications in Hydrology	2020-
Nirdesh Sharma	Soil Moisture	2020-
Sai Kiran Kuntla	Embracing Large-sample Hydrology for Characterization and Mapping of Flooding over India	2020-
Bhanu Magotra	Flood Forecasting using process-based Machine Learning	2020-
Ravi Raj	Soil Erosion and Sediment Transport Modelling over India using High Resolution Gridded Datasets	2019-

M.Tech. Scholar	Title	Year
Shashank	-	2022-23
Suneet Bansal	-	2022-23
Rohan Bargouti	-	2022-23
Gautam Kunwar	Detection and Attribution of Groundwater Changes in India	2021-22
Khusboo Alvi	Multi-Dimensional Characterization of Flooding Events over Indian Peninsular Region	2020-21

B.Tech. Scholar	Title	Year
Hetal Priyadarshi	-	2022
Samar Prakash	-	2022
Ayush Pandey	Improving Streamflow Simulations using LSTM Networks	2021
Rohit Garga	A Deep Learning-based Methodology for SAR-based Flood Mapping	2021
Kaushal Sharma	SAR-based flood mapping using Deep Learning models	2021
Jatin Ahuja	An in-depth study of the timing of streamflow in India including seasonality and variability	2020
Gautam Kunwar	Trends in Groundwater Levels of India	2020
Yash Gupta	Characteristics of Daily Precipitation in India	2020

Workshops Organized

- 2021 "Water and Solid Waste Management", Continuing Education Program, Sponsored by Central Reserve Police Force (CRPF), Duration - 5 months [as Programme Coordinator]

Invited Talks [Technical]

- Dec 2021 Applications of High-Performance Computing, IoT, and AI/ML in Water Resources Management, International Water Innovation Summit, Confederation of Indian Industry (CII)
- July 2020 "Role of Machine Learning in Civil Engineering", Faculty Development Program, Jorhat Engineering College, Assam.
- Nov 2019 "Flood Defense - Plausible solutions rather than possible", *Transforming NE region through Science and Technology Interventions*, Assam Administrative Staff College, Guwahati.
- Nov 2019 "A Water Alliance for Tomorrow", *River-research to Evolve Sustainable-projects for People with Eco-friendly Climate-resilient Technology (RESPECT)*, IIT Guwahati.

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 Service, IIT Delhi

- 2020-21 Institute Representative, Graduate Aptitude Test in Engineering (GATE), IIT Delhi
- 2019-20 Institute Representative, Joint Entrance Examination (JEE) Advanced, IIT Delhi
- 2019-20 Institute Representative, Graduate Aptitude Test in Engineering (GATE), IIT Delhi

Department Service, Department of Civil Engineering, IIT Delhi

- 2020- Water Resources Engineering Laboratory (In-charge)
- 2020- CVN 101 Intro to Civil Engineering (Coordinator)
- 2020-21 CVQ 301 Civil Engineering Seminar (Co-Coordinator)
- 2019- NEN 101 Professional Ethics and Social Responsibility (Department Volunteer)
- 2020-21 B.Tech. Report Evaluation Committee (Jointly)

Editorials

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

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 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