

PUJA DAS

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🌐 Website

in LinkedIn

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Climate scientist and data science expert with PhD in extreme weather modeling and 5+ years developing AI-driven solutions for precipitation forecasting and flood risk assessment. Proven track record leading multi-institutional projects and translating academic research into practical catastrophe risk management tools for diverse stakeholders.

🎓 EDUCATION

- 2020- 2025** **PhD in Interdisciplinary Engineering within the Department of Civil and Environmental Engineering (CGPA- 4.00/4.00)**
Northeastern University, Boston, USA
Courseworks :
- Data Science and AI : Supervised Machine Learning, Time Series and Geospatial Data Sciences, Complex Networks, Remote Sensing.
 - Climate, Environmental Science and Engineering : Climate Science, Engineering Adaptation, and Policy, Critical Infrastructure Resilience, Climate and Atmospheric Change, Hydrologic & Hydraulic Design, Hydrologic Modelling, Population Dynamics.
- 2020-2022** **MS in Civil and Environmental Engineering (Data and Systems), (CGPA : 3.97/4.00)**
Northeastern University, Boston, USA
- 2012-2016** **B.S. in Water Resources Engineering (CGPA : 3.95/4.00)**
Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh

👛 PROFESSIONAL EXPERIENCE

- Feb, 2025- Present** **Institute of Experiential AI, Northeastern University, PORTLAND, ME , USA**
- **Postdoctoral Research Fellow**
 - **Science Team Lead of Weather Ensemble Analytics and Visualization Environment (WEAVE) Project** :Leading interdisciplinary science team developing advanced ensemble weather analytics and visualization tools for enhanced decision-making in weather-sensitive operations.
 - **Operational Flood Forecasting Development** : Developing and deploying operational flood forecasting systems in collaboration with Tennessee Valley Authority (TVA) for real-time flood risk management and hydropower operations. Successfully transitioned research algorithms into production-ready tools for infrastructure operators.
- Sep, 2020- Feb, 2025** **Northeastern University, BOSTON, USA**
- **Project Lead** : Served as the de facto technical and programmatic lead in "Remote sensing data driven Artificial Intelligence for precipitation Nowcasting (RAIN)" project funded by NASA Earth Science Applications. Responsibilities included :
 - Coordinating with NASA scientists, entrepreneurs (Zeus AI), national labs (ORNL), non-profits (RTI), and federal agencies (TVA) to align technical and programmatic goals.
 - Developing hybrid AI-physics-driven products to improve precipitation nowcasting.
 - **Research Assistant** : Conducted independent and multidisciplinary research within the Sustainability and Data Sciences Lab, emphasizing climate and hydrological processes. Key projects include :
 - **Advancing Water Availability Projections** : Evaluated CMIP6 Earth System Models (ESMs) to assess credibility in projecting surface runoff for major rivers worldwide.
 - **Urbanization Impacts on Precipitation Extremes** : Led an analysis of reanalysis datasets and urban-rural classifications to investigate temporal and spatial shifts in precipitation intensity across the continental US.

Jun, 2022- Aug, 2022	Capella Space Corp., SAN FRANCISCO, USA > Data Science and Remote Sensing Intern : Led project on estimating riverine and coastal flood depth utilizing high-resolution flood inundation maps from Synthetic Aperture Radar (SAR) imagery and topography.
May, 2021- Aug, 2021	NASA Ames Research Center, MOFFETTE FIELD, USA > Machine Learning Intern : Conducted preliminary studies, literature review, and dataset preparation for uncertainty-aware machine learning algorithms aimed at quantitative precipitation estimation from geostationary satellites.
Sep, 2020- Feb, 2025	Northeastern University, BOSTON, USA > Graduate and Undergraduate Level Teaching Practicum : Contributed extensively in teaching and academic logistics. Key responsibilities included : > Delivered guest lectures on key topics in courses such as Climate Science, Engineering Adaptation, and Policy; Time Series and Geospatial Data Sciences; Probability and Engineering Economy for Civil Engineering; and Critical Infrastructure Resilience. > Assisted in curriculum development by designing lecture materials, tutorials, and problem sets to enhance student understanding of complex concepts. > Conducted interactive tutorials and discussion sessions, fostering student engagement and deeper comprehension of subject matter. > Held office hours to provide one-on-one support, addressing student queries and guiding them through assignments and projects. > Evaluated and graded assignments, projects, and presentations, providing constructive feedback to support academic growth. > Dialogue of Civilizations Program Coordinator : Fostered cross-cultural learning and provided logistical and academic support in the 2023 and 2024 Dialogue of Civilizations (undergraduate study abroad) programs. Key contributions included : > Designed and delivered orientation sessions to prepare students for immersive international experiences in India and Nepal, covering cultural, logistical, and academic aspects. > Developed and managed comprehensive itineraries for program activities, including travel arrangements, on-site logistics, and daily schedules, ensuring seamless execution. > Facilitated interactive cultural immersion activities, enhancing students' understanding of diverse global perspectives and fostering meaningful engagement with local communities. > Supported students as an Academic Advisor and Program Assistant, offering personalized guidance and fostering a collaborative and enriching learning environment.
Dec, 2017- Aug, 2020	Military Institute of Science and Technology (MIST), DHAKA, Bangladesh > Lecturer : Delivered theory and lab lectures in water resources engineering department. > Junior Environmental Specialist : Monitored and reported environmental parameters (Air Quality, Surface and Ground Water Quality, Noise) for Dhaka Mass Rapid Transit Development Project.

TECHNICAL SKILLS

Geospatial and Network Data Analysis	ArcGIS Pro, QGIS, Gephi, Google Earth Engine
Programming Language	Python, MATLAB, R, SQL, VBA
Watershed Modelling	Hec-RAS, Hec-HMS, SWMM, VIC
Cloud Computing	Cloud storage services and High-Performance Computing (HPC) resources

AWARDS

Outstanding PhD Student Award for Teaching	Northeastern University, 2023
CEE Fellowship Award	Northeastern University, 2020
University Merit List and Deans List Award	Bangladesh University of Engineering and Technology, 2012-2016

INVITED TALK AND PRESENTATIONS

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| 2023-2024 | Presentation at NASA Annual Water Resources Program on NASA RAIN Project on September 17, 2024 and September 28, 2023. |
| 2024 | Presented research to US Air Force Weather (US AFW) on using AI for Weather Forecasting during their visit to Northeastern University on April 26. |
| 2024 | Invited talk at CDM Smith inc. on January 4 on the topic : Precipitation Nowcasting with AI. |
| 2023 | Invited talk for Scalable Solutions for Resilience at United Nations Headquarters for Disaster Risk Resilience Program on May 17. |
| 2023 | Presented research to a delegation from the Indonesian Ministry BAPPENAS during their visit to SDS lab for discussing potential long-term collaborations and grant funding on May 1. |
| 2023 | Presented research to US Department of Transportation (DOT) on "Predictive Insights on Precipitation Nowcasting for Flooding, River, and Hydropower Management". |
| 2023 | Poster Presentation at Industry Leadership Night by Civil and Environmental Engineering Department. |
| 2023 | Presentation at Tennessee Valley Authority on Project Updates. |

PUBLICATIONS

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- **Das, P.**, Ganguly, A., Rabb, N., Smith, K., Islam, S. "Floods, Facts, and Fictions : Numbers and Narratives Behind Bangladesh's 2024 Regional Floods." Preprint at *Earth arXiv*, 2025. (Manuscript in review)
 - Mawalagedara, R., Ray, A., **Das, P.**, Watson, J., Pal, A., Duffy, K., Bhatia, U., Aldrich, D., Ganguly, A. "Non-linear dynamical approaches for characterizing multi-sector climate impacts under irreducible uncertainty." *npj Climate and Atmospheric Science* 8, no. 1 (2025) : 329.
 - **Das, P.**, Posch, A., Barber, N., Hicks, M., Vandal, T., Duffy, K., Singh, D., Werkhoven, K., Ganguly, A. "Hybrid Physics-AI Outperforms Numerical Weather Prediction for Extreme Precipitation Nowcasting." *npj Climate and Atmospheric Science* 7, no. 1 (2024) : 282.
 - **Das, P.**, Ganguly, A. R. "Finer Resolutions and Targeted Process Representations in Earth System Models Improve Hydrologic Projections and Hydroclimate Impacts." *npj Climate and Atmospheric Science*, **8**, 247 (2025).
 - **Das, P.**, "Enhancing Flood Resilience : Predictive Tools for Flood and Flash Flood Nowcasting." International Coalition for Sustainable Infrastructure convening the Climate Resilient Infrastructure Report : A Focus on Technology, 2024. (Launched at COP29).
 - **Das, P.**, "Improving Flood Emergency Management, Bangladesh and Indonesia." International Coalition for Sustainable Infrastructure convening Accelerating Implementation of Disaster Risk Reduction and Resilience in Infrastructure, United Nations Headquarters, 2023.

CONFERENCES

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- **Das, P.**, Posch, A., Barber, N., Duffy, K., Vandal, T., Hicks, M., Singh, D., Werkhoven, K., Ganguly, A. "Exploring Uncertainties and Post-processing for Physics-Embedded Deep Generative Precipitation Nowcasting" AGU Fall Meeting, 2024.
 - Indrawati, D., **Das, P.**, Ganguly, A. "Interdependence and Cascade of Variability Across Regional Projections from Earth System Models" AGU Fall Meeting, 2024.
 - **Das, P.**, Posch, A., Barber, N., Duffy, K., Vandal, T., Hicks, M., Singh, D., Werkhoven, K., Ganguly, A. "Predictive Insights in Hydrology with Hybrid Physics and Data Sciences for Climate Adaptation." Science Understanding through Data Science (SUDS) Conference, 2024.
 - **Das, P.**, Jensen, K., De, S., Ganguly, A. "Flood Depth Estimation using Synthetic Aperture Radar (SAR) Imagery And Topography : A Case Study of the 2021 and 2022 Floods in Hawkesbury Valley, Australia." IEEE IGARSS Conference, 2023.
 - **Das, P.**, Vandal, T., Duffy, K., Barber, N., Ganguly, A. "Remote-sensing data driven Artificial Intelligence for precipitation-Nowcasting ("RAIN")." AGU Fall Meeting, 2023.
 - **Das, P.**, Barber, N., Vandal, T., Posch, A., Duffy, K., Hicks, M., Singh, D., Werkhoven, K., Ganguly, A. "Hybrid Physics and Machine Learning for Precipitation Nowcasting." Statistical Hydrology (STAHY) Conference 2023.
 - **Das, P.**, Ganguly, A. "Evaluation of Surface Runoff Projections from Earth System Models in Major Basins of the World." Fragile Earth 2022 Workshop of the ACM SIGKDD Conference, 2022.
 - Pal, A.K., **Das, P.**, Yadav, N., Ganguly, A. "Robustness of Urban Coastal Rail Network Under Projected Future Floods." Fragile Earth 2022 Workshop of the ACM SIGKDD Conference, 2022.
 - **Das, P.**, Yadav, N., Ganguly, A. "Urbanization Impacts on Precipitation Extremes Statistics and Design Curves for Hydraulic Infrastructures." AGU Fall Meeting, 2022.
 - **Das, P.**, Ganguly, A. "Surface Runoff and Streamflow Projections from Earth System Models." AGU Fall Meeting, 2021.

- > **Das, P.**, Vandal, T., Duffy, K., Ganguly, A. "Preliminary Assessment for Enabling Machine Learning based Quantitative Precipitation Estimation with High Spatio-temporal Resolution from Geostationary Satellites." AGU Fall Meeting, 2021.

MENTORSHIP EXPERIENCE WITH SELECTED EXAMPLES

- 2024 Assisted PhD students in conceptualizing PhD Qualifying exam presentation and supported in formalizing the presentation by developing research methodology.
- 2023 Mentored undergraduate students and guided them through an introduction to machine learning and its application in weather forecasting. Specifically, focused on topics such as generative AI and computer vision.
- 2023 Assisted high school student in researching conditional generative adversarial networks and conducting literature reviews on precipitation nowcasting and introductory earth system modeling.
- 2021 Mentored high school student during the summer on climate model data simulation, providing guidance on handling large datasets and conducting analysis on climate model projections.

SERVICE, OUTREACH AND COLLABORATION

- 2023 - Present Participated in and collaborated on regular strategic reporting to various levels of stakeholders including Northeastern University President.
- 2023 - Present Topic coordinator for 'Short-term Weather Precipitation Nowcasting for Emergency Warnings and River Management' in Frontiers in Water Journal.
- 2023 - Present Engaged as a stakeholder for the development of the Geospatial AI Foundation Model in collaboration with NASA Marshall Center and IBM.
- 2021 - Present Collaborated with postdocs, graduate students, entrepreneurs and SDS lab alumni on research projects (Example : Climate Resilience under Irreducible Uncertainty).
- 2021 - Present Membership in American Geophysical Union (AGU) and American Society for Civil Engineers (ASCE).
- 2024 Assisted Professor in preparing lecture materials at Northwestern University, contributing to the development of AI for Science course.
- 2024 Served as a reviewer for Environmental Data Science journal.
- 2023 Conducted tutorials on Earth System Modelling data analysis for students at Tufts University, providing valuable guidance and support to enhance their understanding of the subject matter.
- 2023 Rapporteur for the Neural Network session at the Artificial Intelligence for Earth System Predictability workshop.

SOFTWARE PRODUCTS

- > **Pretrained Models for QPF** : Implemented machine learning-based pretrained models for Quantitative Precipitation Forecasting (QPF), leveraging advanced AI techniques to enhance predictive accuracy.
- > **Satellite and Radar Observations for QPE** : Built Quantitative Precipitation Estimation (QPE) models by integrating satellite and radar observations, improving the resolution and availability of precipitation data.
- > **Earth System Model Projections for Impact Assessments** : Conducted earth system model projection analysis to assess potential impacts on hydrology and infrastructure resilience under future climate scenarios.