

Mahdi Hasan

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SUMMARY

Climate researcher with expertise in large-scale atmospheric and oceanic circulation, climate variability and change, air-sea interactions, and regional monsoonal extreme precipitation. Proficient in analyzing observational and model datasets, applying advanced statistical analyses, and designing climate model experiments. Committed to advancing climate science and contributing to sustainable solutions for global climate challenges.

EDUCATION

Doctor of Philosophy in Marine, Earth and Atmospheric Sciences July 2025

North Carolina State University, Raleigh, NC, USA

Dissertation: Internally and Externally Forced Interactions between Tropical Ocean and Hadley Circulation (Advisor: Sarah Larson)

Master of Science in Mechanical Engineering Dec 2020

North Carolina A&T State University, Greensboro, NC, USA

Thesis: Control of Separated Flow Using a Dielectric Barrier Discharge Plasma Actuator

Bachelor of Science in Mechanical Engineering Sept 2015

Chittagong University of Engineering & Technology, Chittagong, Bangladesh

EMPLOYMENT

Postdoctoral Research Fellow

North Carolina State University, Raleigh, NC, USA

Aug 2025 - Present

Graduate Research Assistant

North Carolina State University, Raleigh, NC, USA

Jan 2020 - Jul 2025

North Carolina A&T State University, Greensboro, NC, USA

Jan 2019 - Dec 2020

Graduate Teaching Assistant

North Carolina State University, Raleigh, NC, USA

Jan 2020 - Apr 2022

North Carolina A&T State University, Greensboro, NC, USA

Jan 2018 - Dec 2018

TECHNICAL SKILLS

Programming & Data Analysis : Python (Xarray, Scipy, Cartopy, Dask), Fortran, Matlab, Bash, R

Climate Modeling & Post-Processing : CESM, CDO, Ncview

Operating System : MacOS, Linux, Windows

NOTABLE HONORS & AWARDS

- Outstanding Student Presentation Award, International Workshop for mid-latitude air-sea interaction, 2021, Sapporo, Japan.
- Oral Presentation Award, Early Career Technical Conference, 2019, UAB, Birmingham, AL, USA.
- University Merit Scholarship, Chittagong University of Engineering & Technology (CUET), Bangladesh, 2011-2014.
- Board Scholarship in Dhaka division, Bangladesh, based on the result in Secondary School Certificate (SSC) Exam.

PROJECTS

- Determining the Role of Ocean Dynamics in Atlantic Sea Surface Temperature Variations Using a Hierarchy of Coupled Models (NSF funded).
Role: Postdoctoral Researcher Aug 2025 - Present
- Understanding the Role of ENSO on South Asian Summer Monsoon Predictability.
Role: Lead Researcher Aug 2025 - Present
- Climate Change Impact on Extreme Monsoon Rainfall Events over Bangladesh and Northeast India.
Role: Collaborative Researcher Jan 2023 - Dec 2023
- Mechanisms of Intrinsic and Anthropogenically Forced Climate Variations (NSF funded).
Role: Graduate Researcher Jan 2020 - Jul 2025

PUBLICATIONS

In Progress:

- **Hasan, M.,** Larson, S. (2025). Distinct Internal Tropical Pacific Sea Surface Temperature Patterns Drive Similar Uncertainty in the Hadley Circulation Trend, in revision, Nature Communications Earth & Environment.

Peer-Reviewed:

- **Hasan, M.,** Larson, S., McMonigal, K., Robinson, W., Aiyyer, A. (2024). Hemisphere-Dependent Impacts of ENSO and Atmospheric Eddies on Hadley Circulation. *Journal of Climate*, 37(24), 6533-6548.
- Fahad, A. A., **Hasan, M.,** Sharmili, N., Islam, S., Swenson, E. T., Roxy, M. K. (2024). Climate Change Quadruples Flood-causing Extreme Monsoon Rainfall Events in Bangladesh and Northeast India. *Quarterly Journal of the Royal Meteorological Society*, 150(760), 1267-1287.
- **Hasan, M.,** Larson, S., McMonigal, K., Hadley Cell Edge Modulates the Role of Ekman Heat Flux in a Future Climate, *Geophysical Research Letters*, 49(17), 2022.
- **Hasan, M.,** Atkinson, M., Investigation of a Dielectric Barrier Discharge Plasma Actuator to Control Turbulent Boundary Layer Separation, *Applied Sciences Journal*, MDPI, 2020, 10(6), 1911.
- **Hasan, M.,** Atkinson, M., Control of Flow Separation on a Hump Model Using a Dielectric Barrier Discharge Plasma Actuator, *Journal of UAB ECTC*, 18, 148-154, Nineteenth Early Career Technical Conference, University of Alabama, Birmingham 2020.
- **Hasan, M.,** Kabir, A., Akib, Y., Dynamic Stall investigation of Two-Dimensional Vertical Axis Wind Turbine Blades Using Computational Fluid Dynamics, *AIP Conference Proceedings* 2121, 120003, 2019.
- Akib, Y., Kabir, A., **Hasan, M.,** Critical Assessment of Altitude Adaptive Dual Bell Nozzle Using Computational Fluid Dynamics, *International Journal of Engineering Materials and Manufacture* 4(1) 15-21, 2019.
- Kabir, A., Akib, Y., **Hasan, M.,** Islam, J., Comparison of the Aerodynamic Performance of NACA 4415 and KFm based Stepped Airfoils, 3rd International Conference on Mechanical Engineering (ICME), 2019, Bangladesh.
- Akib, Y., Kabir, A., **Hasan, M.,** Characteristics Analysis of Dual Bell Nozzle Using Computational Fluid Dynamics, 3rd International Conference on Mechanical Industrial and Materials Engineering (ICMIME), 2017, Rajshahi, Bangladesh

SCIENTIFIC PRESENTATIONS

- Hemisphere-dependent Response of Hadley Circulation to ENSO and Eddy Forcing, Poster, AGU Annual Meeting, 2024, Washington, D.C., USA.
- Hemisphere-dependent Response of Hadley Circulation to ENSO and Eddy Forcing, Oral, CESM Annual Workshop, 2024, National Center for Atmospheric Science, Boulder, CO, USA.
- The Hadley Cell Edge Modulates the Role of Ekman Heat Flux in a Future Climate, Poster, US CLIVAR Workshop on Confronting Earth System Model Trends with Observations, 2024, Boulder, CO, USA
- Coupling between Hadley Circulation Strength Variability and Wind-stress-driven Ocean Circulation is Hemisphere Dependent, Oral, AMS Annual Meeting, 37th Conference on Climate Variability and Change, 2024, Baltimore, MD, USA.
- Future Changes in the Role of Ekman Heat Flux on SST variability, Oral, AGU Fall Meeting, 2022, Chicago, IL, USA.
- Future Changes in the Role of Ekman Heat Flux on Pacific SST variability, Oral, NCAR Climate Variability and Change Working Group, CESM Annual workshop, 2022 (Online).
- Air-sea Interaction Plays a Different Role in North Pacific Turbulent Heat Flux Exchange in Summer versus Winter, Poster, AGU Fall Meeting 2021, New Orleans, LA (Online).
- The Seasonally Varying Relationship between Air-Sea Fluxes and Large-scale SST in a Coupled Model Hierarchy, Oral, International Workshop for Midlatitude Air-Sea Interaction, 2021, Sapporo, Japan (Online).
- Control of Flow Separation on a Hump Model Using a Dielectric Barrier Discharge Plasma Actuator, Oral, Early Career Technical Conference, 2019, UAB, Birmingham, AL, USA.
- Investigation of Stratified Kelvin-Helmholtz Instability by Integro-Differential Scheme, Poster, 8th Annual College Of Engineering Poster Presentation, 2019, North Carolina A&T State University, Greensboro, NC, USA.

PROFESSIONAL SERVICE

Leadership

- Secretary, Graduate Student Association 2023 - 2024
Department of Marine, Earth & Atmospheric Sciences, North Carolina State University
- Organizing Committee Member, 1st MEAS Symposium 2022
Department of Marine, Earth & Atmospheric Sciences, North Carolina State University
- Steering Committee Member, Community Climate Committee 2020 - 2021
Department of Marine, Earth & Atmospheric Sciences, North Carolina State University
- International Student Representative, Graduate Student Association 2020 – 2021
Department of Marine, Earth & Atmospheric Sciences, North Carolina State University
- Publication Secretary, Engineering Students Association of Bangladesh (ESAB) 2013- 2015

Journal Review

Nature Communications, Journal of Climate, Geophysical Research Letters, Atmospheric Research, Journal of Geophysical Research: Atmospheres.

Outreach

Lectured on weather and climate and led hands-on weather experiments for rural and underrepresented high school students at NC State's SATELLITE Camp. May 2025

PROFESSIONAL DEVELOPMENT

- Workshop on Confronting Earth System Model Trends with Observations, March 2024, National Center for Atmospheric Research, Boulder, CO.
- CESM Tutorial Workshop, August 2021, National Center for Atmospheric Research, Boulder, CO (online).
- Python for Climate and Meteorology, March 2021, American Meteorological Society.
- Member: American Geophysical Union, American Meteorological Society.