

Mahdi Hasan

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SUMMARY

I am a climate researcher with expertise in the analysis of observational and climate model datasets, statistical techniques, and climate modeling. My research focuses on investigating complex interactions between the ocean and atmosphere to better understand climate variability in present and future climates. With a strong background in engineering and computational fluid dynamics, I am skilled in the mathematical analysis and interpretation of data. I am deeply committed to utilizing my expertise to address the urgent challenge of climate change and work towards finding sustainable solutions for our planet.

EDUCATION

- 2020 - present Ph.D. in Atmospheric Science
North Carolina State University, Raleigh, NC, USA
Advisor: Dr. Sarah Larson
- 2019 - 2020 M.Sc. in Mechanical Engineering
North Carolina A&T State University, Greensboro, NC, USA
Advisor: Dr. Michael Atkinson
- 2011 - 2015 B.Sc. in Mechanical Engineering
Chittagong University of Engineering & Technology, Chittagong, Bangladesh.

WORK EXPERIENCE

Research Experience

- Graduate Research Assistant, North Carolina State University Jan 2020 - present
Research: Interplay between wind-driven ocean dynamics and large-scale atmospheric circulation variability in the present and future climate.
Expertise: Climate modeling, Climate variability & prediction, General atmospheric circulation
- Graduate Research Assistant, North Carolina A&T State University Jan 2019 - Dec 2019
Research: Numerical investigation of a dielectric barrier discharge plasma actuator for external aerodynamic flow control.
Expertise: Computational fluid dynamics, Numerical modeling, Aerodynamic flow control

Teaching Experience

- Graduate Teaching Assistant, North Carolina State University Jan 2020 - Apr 2022
Courses: Mathematical Methods for Atmospheric Science, Atmospheric Dynamics, Earth System Science, Introduction to Weather and Climate lab
- Graduate Teaching Assistant, North Carolina A&T State University Jan 2018 - Dec 2018
Courses: Applied Thermodynamics, Propulsion, Vector & Linear Algebra, Calculus 1-3

Leadership Experience

- Secretary, MEAS Graduate Student Association (GSA) 2023 - 2024
Department of Marine, Earth & Atmospheric Science, North Carolina State University
- Organizing Committee Member, 1st MEAS Symposium 2022
Department of Marine, Earth & Atmospheric Science, North Carolina State University
- Steering Committee Member, Community Climate Committee 2020 - 2021
Department of Marine, Earth & Atmospheric Science, North Carolina State University

- International Student Representative, MEAS Graduate Student Association (GSA) 2020 - 2021
Department of Marine, Earth & Atmospheric Science, North Carolina State University
- Publication Secretary, Engineering Students Association of Bangladesh (ESAB) 2013 - 2015

NOTABLE HONORS & AWARDS

- Outstanding Student Presentation Award, International Workshop for mid-latitude air-sea interaction, **2021**, Sapporo, Japan (online).
- Oral Presentation Prize, Early Career Technical Conference, **2019**, UAB, Birmingham, AL, USA.
- University Merit Scholarship, Chittagong University of Engineering & Technology (CUET), Bangladesh, **2011-2014**.
- 2nd Runner-up in ‘Project Show’ competition in Dhaka University IT fest **2013**, Dhaka, Bangladesh.
- Board Scholarship in Dhaka division, Bangladesh, based on the result in Secondary School Certificate (SSC) Exam, **2008**.

TECHNICAL SKILLS

Programming & Data Analysis	: Python, Fortran, Matlab, Bash, R (Basic)
Post Processing	: CDO, NCview, Tecplot, Paraview
Climate Modeling & Multi-physics Simulation	: CESM, Ansys Fluent, OpenFOAM, Comsol
Application	: L ^A T _E X , Microsoft Office
Operating System	: MacOS, Linux, Windows
Computer Aided Design	: SOLIDWORKS, AutoCAD

SCIENTIFIC PRESENTATIONS

- 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
- Hasan, M., S. M. Larson, K. McMonigal, W. A. Robinson, and A. Aiyyer, 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.
- The Linkage Between Anomalous Wind-Driven Ocean Circulation and Hadley Circulation, **Poster**, *MEAS 2nd Annual Symposium*, 2023, North Carolina State University, Raleigh, NC, 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.
- Future changes in the role of Ekman heat flux on Pacific SST variability, **Oral**, *3rd ESOM Symposium, George Mason University*, 2022, Fairfax, VA, USA.
- 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 COE Poster Presentation*, 2019, North Carolina A&T State University, Greensboro, NC, USA

PUBLICATIONS

In Progress:

Hasan, M., Larson, S., McMonigal, K., Robinson, W., Aiyyer, A. (2023). Hemisphere-dependent Response of Hadley Circulation to ENSO and Eddy Forcing. *Journal of Climate*, in Review.

Peer-Reviewed:

Fahad, A.A., **Hasan, M.**, Sharmili, N., Islam, S., Swenson, E.T. and Roxy, M.K. (2023), Climate Change Quadruples Flood Causing Extreme Monsoon Rainfall Events in Bangladesh & Northeast India. *Q J R Meteorol Soc.* Accepted Author Manuscript. <https://doi.org/10.1002/qj.4645>

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, <https://doi.org/10.1029/2022GL100401>.

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, doi: 10.3390/app10061911.

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., Control of Separated Flow Using a Dielectric Barrier Discharge Plasma Actuator, *Master's Thesis*, 2019, North Carolina A&T State University.

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, doi: 10.1063/1.5115940.

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.**, Critical Assessment of Altitude Adaptive Dual Bell Nozzle Using Computational Fluid Dynamics, *International Journal of Engineering Materials and Manufacture* 4(1) 15-21, 2019, doi: 10.26776/ijemm.04.01.2019.02

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.

WORKSHOPS & TRAINING ATTENDED

- NCAR CESM Tutorial Workshop, August 2021, National Center for Atmospheric Research, Online.
- Python for Climate and Meteorology, March 2021, American Meteorological Society, Online.

PROFESSIONAL SERVICES & MEMBERSHIP

- Reviewer: *Journal of Climate*, *Geophysical Research Letters*

– Member: American Geophysical Union (AGU), American Meteorological Society (AMS)