Storm A. Mata

Contact Information
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Education

Massachusetts Institute of Technology — *exp. grad.* **June 2026 | Cambridge, MA**
Doctor of Philosophy in Environmental Engineering

Dartmouth College — **June 2019 | Hanover, NH**
Bachelor of Arts in Engineering Sciences

Freie Universität Berlin — **June - Dec. 2016 | Berlin, DE**
Foreign Study Program

Fellowships and Grants

Computational Science Graduate Fellowship — **2022 - Present**
United States Department of Energy

Gates Millennium Scholarship — **2015 - Present**
Bill & Melinda Gates Foundation

John L. Murphy Research Grant — **2017**
Dartmouth College Office of Undergraduate Advising and Research, and John L. Murphy Family Fund

Research Experience

Doctoral Research — **2021 - Pres. | Cambridge, MA**
Advisor: Michael Howland, PhD
Ongoing investigations:

- Investigating the effect of wind speed and direction shear on utility-scale turbine power production through analysis of field data consisting of LiDAR wind profile measurements and concurrent turbine SCADA data
- Quantifying the accuracy of existing actuator disc and blade element theory models in reproducing the effect of shear on power production observed in the field data from arbitrary wind speed and direction inputs
- Assessing the impact of deviations from canonical atmospheric boundary layer profiles (e.g., the power law for wind speed) on turbine model power predictions

Future avenues of research:

- Refinement of power models through incorporation of additional determinants of turbine power production
- Coupling enhanced power models with downscaled Global Circulation Model outputs to estimate future changes in wind power generation due to changing wind patterns

- Development of a framework for siting and design of future wind farms using enhanced power models to account for the effect of shear on power production

National Renewable Energy Laboratory (NREL) Internship **2024 | Golden, CO**
Wind Profile Reconstruction in the Boundary Layer using Conditional Diffusion Models
Advisors: Eliot Quon, PhD and Regis Thedin, PhD

- Developed a machine-learning method for reconstructing partial wind profiles in the atmospheric boundary layer on length time scales necessary for wind energy applications
- Implemented a conditional diffusion model to generate complete wind profiles using sparse information from mesoscale and microscope measurements, such as reanalysis and LiDAR data

Undergraduate Thesis **2019 | Hanover, NH**
Analysis of Delivery and Return Temperatures for Dartmouth Hot Water Network
Advisor: Benoit Cushman-Roisin, PhD

- Conducted a case study of district energy systems in the United States and calculated the energy-saving potential of the proposed hot-water distribution network for Dartmouth College
- Analyzed current steam and electricity usage to determine weather-normalized consumption and existing heat load and power demand for campus buildings
- Calculated minimum hot water delivery temperatures and flow rates, district-side heat exchanger areas, and building-side radiator surface areas required as part of campus-wide steam-to-hot-water conversion

John L. Murphy Research Grant Project **2017 | Hanover, NH**
A Data-Driven Analysis of Operating Room Scheduling Under Uncertainty
Advisor: Vikrant Vaze, PhD

- Studied a new method for operating room scheduling using an overtime cost-minimization function validated against 64 million anonymized electronic medical records containing surgery type and duration
- Conducted Monte Carlo simulations to test the efficiency of the new model against conventional open scheduling and block scheduling techniques

Research Mentorship Project **2015 | Oklahoma City, OK**
Characterization and Quantitation of Soluble HLA Molecules in Human Plasma
Advisor: Rico Buchli, PhD

- Studied the viability of measuring soluble class I Human Leukocyte Antigen chain E (sHLA-E) concentration in human plasma as a means for early disease detection
- Quantified baseline blood serum level of sHLA molecules at 494 ng/ml
- Performed “sandwich" enzyme-linked immunosorbent assays to screen 100 volunteer blood donor samples with known HLA-phenotypes

Academic Honors

Vice Chancellor’s Inclusive Excellence Award **2021**
Massachusetts Institute of Technology, Vice Chancellor of the Institute

Chevron Civil and Environmental Engineering Graduate Scholarship **2021**
Chevron Corporation

Science Post Graduate Scholarship **2021**
United States Department of the Interior

Virginia Department of Transportation (VDoT) Scholarship **2021**
Virginia Department of Transportation

Barbara T. Sleepeck (1941) Endowed Scholarship **2015 - 2019**
Dartmouth College Endowed Scholarship Fund

Barrett All-Round Achievement Cup **2019**
Dartmouth College, Dean of the College

Henry Weiss '60 Award **2019**
Dartmouth College, Dean of Undergraduate Advising

First Year Emerging Leader Award **2016**
Dartmouth College Office of Pluralism and Leadership

National Merit Scholarship Finalist **2015**
National Merit Scholarship Corporation

Publications

S. A. Mata, J. J. Pena Martínez, J. Bas Quesada, F. Palou Larrañaga, N. Yadav, J. S. Chawla, V. Sivaram, and M. F. Howland, "**Modeling the effect of wind speed and direction shear on utility-scale wind turbine power production**," *Wind Energy*, vol. 27, no. 9, pp. 873-899, Aug. 2024, doi: 10.1002/we.2917

Presentations

S. A. Mata, K. S. Heck, and M. F. Howland, "**The effects of wind shear on rotor aerodynamics**," presented at the 77th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Salt Lake City, UT, Nov. 25, 2024 (Presentation).

S. A. Mata and M. F. Howland, "**The influence of wind speed and direction shear on rotor aerodynamics**," presented at NAWEA/WindTech 2024 Conference, New Brunswick, NJ, Nov. 1, 2029 (Presentation).

S. A. Mata and E. W. Quon, "**Wind profile reconstruction in the atmospheric boundary layer using conditional diffusion models**," presented at International Energy Agency Wind Task 52 Meeting, New Brunswick, NJ, Oct. 2, 2029 (Presentation).

S. A. Mata and E. W. Quon, "**Using machine learning to enhance wind energy resource modeling**," presented at Power Shift: Energy, Innovation, Sustainability, and Equity, a symposium of the Harvard Radcliffe Institute, Cambridge, MA, Oct. 22, 2024 (Poster).

S. A. Mata and E. W. Quon, "**Wind Profile Reconstruction in the Atmospheric Boundary Layer with Conditional Diffusion Models**," presented at the 2024 MIT Energy Initiative Annual Research Conference, Cambridge, MA, Sep. 25, 2024 (Poster).

S. A. Mata, E. W. Quon, and R. S. Thedin, "**On the Stability of Coupled Mesoscale-Microscale Simulations: A Case Study in the Southern Great Plains Region**," presented at the 2024 DOE CSGF Annual Program Review, Washington, DC, Jul. 17, 2024 (Poster).

S. A. Mata and M. F. Howland, "**Investigating coupling between wind shear and utility-scale wind turbines**," presented at the 76th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Washington, DC, Nov. 20, 2023 (Presentation).

S. A. Mata and M. F. Howland, "**Modeling the effect of wind speed and direction shear on utility-scale wind turbine power production**," presented at the NAWEA/WindTech 2023 Conference, Denver, CO, Oct. 31, 2023 (Presentation).

S. A. Mata and M. F. Howland, "**Modeling the influence of variations in wind speed and direction in the atmospheric boundary layer on utility-scale wind turbine power production**," presented at the 2023 DOE CSGF Annual Program Review, Washington, DC, Jul. 19, 2023 (Poster).

S. A. Mata and M. F. Howland, "**Modeling the effect of shear on wind turbine performance**," presented at the Massachusetts Institute of Technology, Department of Civil and Environmental Engineering Research Day, Cambridge, MA, Feb. 14, 2023 (Presentation).

S. A. Mata and M. F. Howland, "**Modeling the effect of wind speed and direction shear on utility-scale wind turbine performance**," presented at the 75th Annual Meeting of the American Physical Society, Division of Fluid Dynamics, Indianapolis, IN, Nov. 20, 2022 (Presentation).

S. A. Mata, K. S. Klemmer, and M. F. Howland, "**The impact of uncertainty on wind energy modeling**," presented at the Massachusetts Institute of Technology Climate and Sustainability Annual Consortium, Cambridge, MA, Oct. 18, 2022 (Poster).

S. A. Mata and M. F. Howland, "**The effect of wind shear on wind turbine power production**," presented at the Massachusetts Institute of Technology, Department of Civil and Environmental Engineering Research Day, Cambridge, MA, Apr. 19, 2022 (Poster).

R. Buchli, S. Buchli, E. Henshaw, S. Mata, R. VanGundy, J. Collard, E. Judd, W. Hildebrand, and J. Smith, "**Characterization and quantitation of soluble HLA molecules in human plasma**," in *ASHI 43rd Annual Meeting,* Sep. 15, 2017, doi:10.1016/j.humimm.2017.06.158.

S. A. Mata and R. Buchli, "**Development of standardized HLA-E assay procedure**," presented at the University of Oklahoma Health Sciences Center, Graduate Research Education and Technology (GREAT) Symposium, Oklahoma City, OK, Mar. 27, 2015 (Poster).

Professional Experience

EN-POWER GROUP **June 2019 - Sept. 2021 | New York, NY**
Energy Engineer

- Performed comprehensive building energy usage analysis and carbon emissions modeling to identify opportunities for energy recovery and renewable generation
- Developed deep energy retrofit modeling tools to determine energy savings and payback for emerging envelope, HVAC, and building management system technologies
- Conducted ASHRAE Level II audits to identify retro-commissioning measures and capital improvements to yield maximum energy savings in multifamily and commercial buildings
- Assisted in project management of energy-saving capital upgrade projects by coordinating sub-contractor workflow
- Facilitated federal, state, and local rebates for capital improvement cost mitigation in New York and New Jersey

Dartmouth College, Division of Engineering and Utilities **Jan. - June 2019 | Hanover, NH**
Sustainability and Engineering Program Assistant

- Performed a full ASHRAE Level II energy audit of the heating, cooling, ventilation, and lighting systems in New Hampshire Hall dormitory to identify energy conservation measures
- Presented findings to department leadership for review to guide planned renovations

Thayer School of Engineering **Sept. 2018 - June 2019 | Hanover, NH**
Teaching Assistant for ENGS 44: Sustainable Design

- Devised and implemented the course design project by defining the problem question and meeting with local City of Lebanon Public Works Department officials to gather supplemental land survey information for students to use
- Provided academic support during weekly tutorials and graded homework assignments

Professional Certifications

Engineer-in-Training
State of California
Certificate No. EIT 171501

OSHA-10 Construction Safety
Occupational Safety and Health Administration
Certificate No. 36-006265259

Multifamily Building Analyst
Building Performance Institute
Certificate No. 5063974

SOLIDWORKS Mechanical Design Associate
Dassault Systèmes
Certificate No. C-A8SEEWLGQF

Service and Leadership

MIT Department of Civil and Environmental Engineering - Committee on Diversity, Equity, and Inclusion **2021 - Present**
Graduate Student Representative

- Developing an action plan of short and long-term changes including increased outreach and external partnerships, establishing new student fellowships, updating admissions practices, and creating robust anonymous feedback mechanisms for accountability

MIT School of Engineering Graduate Student Advisory Group **2023 - Present**
Graduate Student Representative for Civil and Environmental Engineering

- Building a cohesive alumni community to provide professional networking and career opportunities for the benefit of current and future students

MIT Department of Civil and Environmental Engineering - Department Head Advisory Committee **2023 - Present**
Chair

- Providing confidential recommendations and feedback to the Department Head on matters relating to the wellbeing of undergraduate students, graduate students, and postdocs

Dartmouth College Admissions Ambassador Program **2023 - Present**
Alumni Admissions Interviewer

- Interviewing undergraduate admissions candidates

Oklahoma School of Science and Mathematics Alumni Engagement Team **2023 - Present**
Team Member

- (Established Jul. 2023) Building a cohesive alumni community to provide professional networking and career opportunities for the benefit of current and future students

MIT Summer Research Program (MSRP) Admissions **2021 - Present**
Admissions Application Reader

- Increasing the number of underserved scholars in research enterprises by preparing them to pursue advanced degrees by conducting research under the guidance of MIT faculty members, postdoctoral fellows, and advanced graduate students

Oklahoma School of Science and Mathematics Admissions **2020 - Present**
Alumni Admissions Application Reader and Interviewer

- Reading applications and interviewing candidates for admission based on appetite for learning and previous academic qualifications and accomplishments

MIT Refugee Action Hub (ReACT) **2022**
Capstone Course Co-Advisor

- Co-advised a group of students on their capstone project using climatological data to analyze the effects of climate change in central Asia and the Middle East

EN-POWER GROUP - Committee for Recruitment and Retention **2020 - 2021**
Co-founding Committee Member

- Facilitated open communication with management regarding recruitment procedures, hiring initiatives, and retention services, especially as they relate to candidates and current employees from underrepresented groups

Dartmouth College Academic Skills Center **2018 - 2019**
Peer Academic Enrichment Intern

- Organized and managed official study groups and individual tutoring sessions for all 42 academic departments in the College of Arts and Sciences

Dartmouth College Interim Meals and Programs Committee **2018 - 2019**
Student Committee Member

- Assisted in planning and operation of an interim meals purchase and distribution program for students who remained on campus between academic terms

Dartmouth College Office of Pluralism and Leadership **2017 - 2018**
Student Assistant Office Manager

- Supported the office Executive Assistant in coordinating day-to-day operations of the identity-based advising programs, anti-bias trainings, and advocacy initiatives

Dartmouth College Latinx Student Advising **2017**
Marketing Intern

- Assisted the Dean of Latinx Advising with developing and rolling out the IMPACT Leadership Program to equip underrepresented students with the skills necessary to advocate for themselves and their communities, both on and off campus

Dartmouth College LGBTQIA+ Student Advising **2016**
Student Activities Coordinator

- Assisted the Dean of LGBTQIA+ Advising with planning and administration of community-building and support programs for students and staff