

### Georgia Tech College of Sciences School of Earth and Atmospheric Sciences

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# Postdoctoral Research Position in Physics-informed Machine Learning for Climate Extremes

The Climate Risk and Extreme Dynamics Lab at the Georgia Institute of Technology invites applications for a highly motivated postdoctoral research position focused on advancing physicsinformed machine learning techniques for the prediction and risk assessment of climate extremes, particularly hurricanes and their associated multi-hazards (e.g., storm surge, extreme rainfall, compound flooding, and cascading impacts). The successful candidate will contribute to a project funded by the Sandia National Laboratories, focused on integrating physics-based models with state-of-the-art deep learning architectures. The overarching goal is to enhance short-term forecasting and long-term risk prediction of hurricane-induced multi-hazards and their compounding and cascading impacts under a changing climate. The project leverages advanced machine learning techniques—including transformer networks, diffusion models, and graph neural networks—to improve multi-hazard predictions, while also incorporating reinforcement learning to develop and evaluate adaptation strategies that support science-informed decision-making under deep uncertainty.

## **Key Responsibilities**

- Develop novel hybrid modeling frameworks that couple physics-based tropical cyclone simulations with advanced machine learning algorithms.
- Investigate the predictability of hurricanes and their secondary impacts (e.g., flooding, infrastructure disruption, power outages), with a focus on enhancing probabilistic forecasting, uncertainty quantification, and impact assessment.
- Contribute to the preparation of peer-reviewed manuscripts, technical reports, and conference presentations.
- Collaborate with interdisciplinary teams of faculty, postdoctoral researchers, and graduate students at Georgia Tech and affiliated institutions.
- Pursue independent research ideas aligned with the group's themes and seek opportunities for research proposal development.

The position is under the supervision of Dr. Ali Sarhadi, and the researcher will be supported with mentorship in professional development areas including research design, scientific communication, grant writing, leadership, and academic job market preparation. To learn more about our group, please visit <u>www.sarhadilab.org</u>.

## Qualifications

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School of Earth and Atmospheric Sciences

Atlanta, Georgia 30332-0700 U.S.A.

Phone: 404.894.3893

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Applicants should hold a Ph.D. in computer science, computational science and engineering, physics, applied mathematics, or a closely related discipline. The ideal candidate will have demonstrated expertise in machine learning, with a particular focus on deep learning, and a strong preference will be given to those with experience in climate modeling and Earth system science applications. Extensive experience with state-of-the-art machine learning methodologies is essential. Strong written and oral communication skills, along with a demonstrated record of peer-reviewed scientific publications, are also required. **Please note that U.S. citizenship is a mandatory requirement to comply with the project's funding terms.** 

## **Position Details**

- Start Date: Anticipated in May 2025 (flexible).
- Duration: Initial one-year appointment, with potential renewal for a second year based on performance and continued funding.
- Salary: \$65,000 per year, inclusive of a comprehensive benefits package.

## **Application Instruction**

To apply, please send a single PDF by May 25th, 2025, to Dr. Ali Sarhadi at <u>sarhadi@gatech.edu</u>, containing the following:

- 1. A cover letter detailing your interest in the position and qualifications.
- 2. A curriculum vitae (CV).
- 3. Contact information for 2-3 professional references.
- 4. (Optional) A 1–2-page statement describing your research interests.

Prospective applicants are encouraged to reach out to Dr. Sarhadi with questions or to discuss potential alignment prior to submitting their application.

## **About Georgia Tech**

The Georgia Institute of Technology is a leading public research university located in Atlanta, a vibrant, culturally diverse city with robust economic sectors. Serving over 45,000 students, Georgia Tech is globally recognized for its top-tier programs in engineering, computing, sciences, business, design, and liberal arts. In the past year, Georgia Tech faculty secured over \$1.4 billion in research funding across disciplines, including artificial intelligence, energy sustainability, semiconductors, neuroscience, and national security. Georgia Tech ranks in the top

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20 U.S. universities for research and development expenditures and is ranked No. 1 among U.S. institutions without a medical school.

### About the School of Earth and Atmospheric Sciences

The School of Earth and Atmospheric Sciences (EAS) at the Georgia Institute of Technology is highly interdisciplinary and covers broadly all fields of Earth and space science. EAS hosts a range of undergraduate degrees, including B.S. programs in Atmospheric and Oceanic Sciences, Solid Earth and Planetary Sciences, and Environmental Science, and hosts a distinct interdisciplinary Ph.D. program in Ocean Science and Engineering in collaboration with the School of Biological Sciences and Environmental Engineering. For more information about our School and academic programs, visit <u>https://eas.gatech.edu/home</u>.

The EAS includes 35 academic faculty members whose research areas cover the earth, atmospheric, oceanic, and planetary sciences as well as interdisciplinary climate and earth system research. The school provides a vibrant and inclusive academic environment, preparing students to advance geoscience knowledge and become leaders in academia, government, and industry.

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