Rebecca Gjini

Keith Julien Visiting Assistant Professor
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Education

Scripps Institution of Oceanography, UC San Diego — La Jolla, CA
Institute of Geophysics and Planetary Physics — 2021 - 2026
Ph.D. in Earth Sciences
M.Sc. in Earth Sciences

Lehigh University — Bethlehem, PA
B.S. in Mathematics, *with highest honors* — 2017–2021
Minors in Computer Science and Environmental Studies

Positions

Department of Applied Mathematics, University of Colorado Boulder — Boulder, CO
Keith Julien Visiting Assistant Professor — Summer 2026 - Present

Scripps Institution of Oceanography, UC San Diego — La Jolla, CA
Institute of Geophysics and Planetary Physics — Summer 2021 - Summer 2026
Graduate Research Assistant

- Auto-differentiable atmospheric model calibration across timescales
- Iterative ensemble methods for estimating parameters from time-averaged data
- Feature-based data assimilation for stratocumulus cloud microphysics

Argonne National Laboratory — Lemont, IL
Student Research Participant in the Mathematics and Computer Science Division — Spring 2021

- Exploiting automatic differentiation in a Python multiple Doppler radar wind retrieval package

Publications

Preprints

Gjini, **R.**, Morzfeld, M., Glassmeier, F., & Feingold, G. (2026). Technical note: Evaluation of conceptual predator-prey models for the quantitative modeling of precipitating open-cell stratocumulus via feature-based bayesian inversion of a suite of large eddy simulations. *EGUsphere*, *2026*, 1–31. https://doi.org/10.5194/egusphere-2026-2871

Published

Gjini, **R.**, Morzfeld, M., Dunbar, O. R. A., & Schneider, T. (2026). The Ensemble Kalman Inversion Race. *Journal of Advances in Modeling Earth Systems*, *18*(9), e2025MS005629. https://doi.org/10.1029/2025MS005629

Davenport, E. H., Madan, J. V., **Gjini**, **R.**, Brzenski, J., Crawford, B., Ho, N., Hsu, T.-Y., Liang, Y., Liu, Z., Manivannan, V., Pham, E., Vutukuru, R., Williams, A. I. L., Yang, Z., Yu, R., Lutsko, N. J., Hoyer, S., & Watson-Parris, D. (2026). JCM v1.1: A differentiable, intermediate-complexity atmospheric model. *Geoscientific Model Development*, *19*(14), 6451–6466. https://doi.org/10.5194/gmd-19-6451-2026

Clancy, R. J., Menickelly, M., Hückelheim, J., Hovland, P., Nalluri, P., & **Gjini**, **R.** (2022). TROPHY: Trust Region Optimization Using a Precision Hierarchy. *Computational Science – International Conference on Computational Science 2022*, 445–459. https://doi.org/10.1007/978-3-031-08751-6_32

Jackson, R., **Gjini**, **R.**, Narayanan, S. H. K., Menickelly, M., Hovland, P., Hückelheim, J., & Collis, S. (2022). Improving PyDDA's atmospheric wind retrievals using automatic differentiation and Augmented Lagrangian methods. *SciPy 2022*. https://doi.org/10.25080/majora-212e5952-01f

Outreach Articles

Gjini, **R.** (2023). Stratocumulus Clouds and Predator-Prey Dynamics. *SIAM News Blog*.

Presentations

Invited

1. The Ensemble Kalman Inversion Race, *U.S. Association of Computational Mechanics (USACM) Energy and Earth Systems Technical Thrust Area*, (February 2026).
2. Derivative-Free, Ensemble-Based Optimization for Inverse Problems with Time-Averaged Data and Chaotic Dynamics, *Centre for Mathematics of Planet Earth at the University of Reading*, (May 2025).
3. Mapping Meteorological Conditions to Predator Prey Dynamics, *Learning the Earth with Artificial Intelligence (LEAP) and NASA Goddard Institute for Space Studies at Columbia University in the City of New York*, (June 2023).
4. Automatic Differentiation and Optimization in a Pythonic Direct Data Assimilation Framework for Wind Retrievals, *Center for Western Weather and Water Extremes,* (October 2022).

Oral

1. The Ensemble Kalman Inversion Race, *SIAM Conference on Uncertainty Quantification (UQ26)*, (March 2026).
2. Derivative-Free, Ensemble-Based Optimization for Inverse Problems with Time-Averaged Data and Chaotic Dynamics, *20th International EnKF Workshop*, (June 2025).
3. Connecting Large-Eddy Simulations of Stratocumulus Clouds to Predator-Prey Dynamics Via Feature Based Inversions, *Southern California Applied Mathematics Symposium (SOCAMS)*, (April 2024).
4. Connecting Large-Eddy Simulations of Stratocumulus Clouds to Predator-Prey Dynamics Via Feature Based Inversions, *SIAM Conference on Uncertainty Quantification (UQ24)*, (February 2024).
5. Mapping Meteorological Conditions to Predator-Prey Dynamics, *SIAM Conference on Computational Science and Engineering (CSE23)*, (March 2023).
6. Automatic Differentiation and Optimization in a Pythonic Direct Data Assimilation Framework for Wind Retrievals, *International Conference on Continuous Optimization (ICCOPT)*, (July 2022).

Poster

1. Ensemble-Based Optimization Methods for Estimating Parameters from Time-Averaged Data, *Collaborative Research Center (CRC) International Summer School*, (September 2024).
2. Mapping Meteorological Conditions to Predator-Prey Dynamics, *American Geophysical Union (AGU) Annual Meeting*, (December 2023).
3. Mapping Meteorological Conditions to Predator-Prey Dynamics, *Scientific Machine Learning Symposium at UCSD*, (March 2023).
4. Graph Scattering Transform, *Joint Mathematics Meetings in the MAA Undergraduate Student Poster Session*, (2021).
5. Graph Scattering Transform, *Shenandoah Undergraduate Mathematics and Statistics Conference*, (2020).

Teaching

- **Instructor** at University of Colorado Boulder — Aug. 2026 - Present
  Pre-Calculus for Engineers (APPM 1235)
- **Instructor and Teaching Assistant** during SIO's Python for Earth Science Software Workshop — Aug. 2025
  Introduction to Python programming
- **Teaching Assistant** volunteer at the Institute for Pure and Applied Mathematics — Fall 2024
  Practicum for Undergraduate MAthematicians (PUMA) in Inverse Problems and Data Assimilation
- **Teaching Assistant** at UC San Diego — Fall 2024
  Climate Change and Society (SIO 25)
- **Instructor** during SIO's Summer Math Workshop — Aug. 2022, Aug. 2023
  Introduction to linear algebra
  Introduction to probability and statistics
- **Grading Assistant** at Lehigh University — Fall 2018 - Fall 2020
  Design and Analysis of Algorithms (CSE 340)
  Discrete Structures and Algorithms (CSE 140)
  Linear Methods (MATH 205)

Professional Activities

Conference/Session Chair

- SIAM Conference on Computational Science and Engineering (CSE27) — March 2027
  Minisymposium: Advances in Weather/Climate Modeling: Calibration, Validation, and Uncertainty Quantification
- SIAM Conference on Uncertainty Quantification (UQ26) — March 2026
  Minisymposium: Numerical UQ Methods for Earth Science
- SIAM Conference on Computational Science and Engineering (CSE23) — March 2023
  Minisymposium: Understanding Cloud Physics Using Stochastic, Dynamical, and Data-Driven Modeling
- International Conference of Continuous Optimization (ICCOPT) — July 2022
  Computational Science and Engineering Applications of Automatic Differentiation and Optimization

Committees

- CaCAO (Chaos Computation Analysis and Optimization) Organizing Committee — January 2023 - July 2026
  Scripps Institution of Oceanography
- Computing Committee — September 2023 - July 2026
  Scripps Institution of Oceanography
- Community Anti-Bullying and Anti-Harassment (CAB) Task Force — September 2022 - 2024
  Scripps Institution of Oceanography

Mentoring

- Geosciences Education and Mentorship Support (GEMS) Mentor — September 2022 - 2025
  Ruby and Sapphire track mentor
- Scripps Student Mentor — September 2022 - 2025
  Scripps Institution of Oceanography

Scholarships and Awards

- Rising Stars in Computational and Data Sciences 2026 attendee 2026
- Student Travel Award for the SIAM Conference on Uncertainty Quantification 2024, 2026
- Scripps Institution of Oceanography (SIO) Department Student Award 2023, 2025
- Outstanding Student Presentation Award from the 2023 American Geophysical Union Annual Meeting 2023
- Student Travel Award for the SIAM Conference on Computational Science and Engineering 2023
- Geosciences of the Earth, Oceans and Planets (GEO) Program Winter 2022 Scripps Fellowship 2022
- Contribution to Student Life Award (from Lehigh University) 2020

Skills and Expertise

- **Programming Languages:** Python, Julia, MATLAB, R, Java
- **Technology:** High-performance computing, Git, Unix Shell, Vim, LaTex, Beamer, Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Keynote