Shay Gilpin

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Education

2023 *Doctorate in Philosophy*
University of Colorado, Boulder
Applied Mathematics. Advisors: Dr. Tomoko Matsuo and Dr. Stephen E. Cohn.

2022 *Masters of Science*
University of Colorado, Boulder
Applied Mathematics.

2017 *Bachelor of Arts*
University of California Santa Cruz
Mathematics with a pure concentration, minor in Chemistry. Summa cum laude with highest honors in the major.

Fellowships

2019 *National Science Foundation Graduate Research Fellowship*
Five year graduate research fellowship funded through the National Science Foundation that supports outstanding graduate students in the science, technology, engineering, and mathematics disciplines. Awarded in April 2019.

Research Experience

2023 *Postdoctoral Research Associate I*
University of Arizona, August 2023 – Present

National Science Foundation Graduate Research Fellow
University of Colorado Boulder, August 2019 – August 2023
Graduate research on covariance propagation associated with data assimilation funded by the National Science Foundation Graduate Research Fellowship. Advisor: Dr. Tomoko Matsuo

2019 *Visiting Scientist*
UCAR COSMIC Program, October 2017 – March 2019
Research scientist for two projects regarding scientific applications of radio occultation for the University Corporation for Atmospheric Research (UCAR) Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) program. Advisor: Dr. Richard Anthes

2017 *SOARS Protegé*
UCAR, June – October 2017; June – August 2016
Significant Opportunities in Atmospheric Research and Science (SOARS) research intern at the COSMIC Program.

Publications

2023 **Gilpin, S.**, Matsuo, T., and Cohn, S.E., 2023: *A generalized, compactly-supported correlation function for data assimilation applications, Q. J. Roy. Meteor. Soc.*, 149, 1953 – 1989, https://doi.org/10.1002/qj.4490.

2022 **Gilpin, S.**, Matsuo, T., and Cohn, S.E., 2022: *Continuum covariance propagation for understanding variance loss in advective systems, SIAM/ASA J. Uncertainty Quantification*, 10, 886 – 914, https://doi.org/10.1137/21M1442449.

2019 **Gilpin, S.**, Anthes, R., and Sokolovskiy, S., 2019: *Sensitivity of forward-modeled bending angles to vertical interpolation of refractivity for radio occultation data assimilation, Mon. Wea. Rev.*, 147, 269 – 289, https://doi.org/10.1175/MWR-D-18-0223.1

2018 **Gilpin, S.**, Rieckh, T., and Anthes, R., 2018: *Reducing representativeness errors during radio occultation – radiosonde comparisons, Atmos. Meas. Tech.*, 11, 2567 – 2582, https://doi.org/10.5194/amt-11-1-2018.

Conference Activity

2023 **Gilpin, S.**, Matsuo, T., and Cohn, S.E., 2023: *Covariance propagation in data assimilation: a continuum analysis for advective systems.* Invited Presentation, Mathematical Approaches of Atmospheric Chemical Constituent Data Assimilation and Inverse Modeling Workshop, Banff, Alberta, CAN, March 19 – 24, 2023.

Gilpin, S., Matsuo, T., and Cohn, S. E.: *A generalized, compactly-supported correlation function for data assimilation applications.* Oral Presentation, American Meteorological Society Annual Meeting, Denver, CO, January, 2023.

2021 **Gilpin, S.**, Matsuo, T., and Cohn, S. E.: *Continuum covariance propagation for understanding variance loss in advective systems.* Poster Presentation, WCRP-WWRP Joint Symposium on Data Assimilation and Reanalysis (virtual), September 12 – 18, 2021.

Gilpin, S., Matsuo, T., and Cohn, S. E.: *Continuum covariance propagation for understanding variance loss in advective systems.* Contributed Presentation, Society for Industrial and Applied Mathematics (SIAM) Conference on Mathematical & Computational Issues in the Geosciences (virtual), June 21 – 24, 2021.

Gilpin, S., Matsuo, T., and Cohn, S. E.: *Continuum covariance propagation for understanding variance loss in advective systems.* Oral Presentation, International Symposium on Data Assimilation (virtual), March 12, 2021.

2019 **Gilpin, S.**: *Bringing science to the next generation: the impacts of Richard Anthes on a young scientist's carrer.* Invited Oral Presentation, American Meteorological Society Annual Meeting, Phoenix, AZ, 2019.

Gilpin, S., Rieckh, T., and Anthes, R.: *Reducing representativeness errors during radio occultation – radiosonde comparisons.* Oral Presentation, American Meteorological Society Annual Meeting, Phoenix, AZ, 2019.

2018 **Gilpin, S.**, Anthes, R., Sokolovskiy, S., and Rieckh, T.: *Calculation of radio occultation bending angles from models: sensitivity to vertical interpolation methods.* Oral presentation, American Meteorological Society Annual Meeting, Austin, TX, 2018.

2017 **Gilpin, S.**, Anthes, R., Sokolovskiy, S., and Rieckh, T.: *Calculation of radio occultation bending angles from models: sensitivity to vertical interpolation methods.* Poster presentation, COSMIC/IROWG Workshop, Estes Park, CO, 2017.

Gilpin, S., Rieckh, T., Anthes, R., and Lu, G.: *An elliptical approach to radio occultation and radiosonde comparisons.* Poster presentation, American Meteorological Society Annual Meeting, Seattle, WA, 2017.

Software

2023 *A Generalied Gaspari-Cohn Correlation Function*, https://doi.org/10.5281/zenodo.7859258
Python software to construct the Generalized Gaspari-Cohn correlation function published in Gilpin et al., (2023).

Honors, Awards, and Certificates

2022 *Certificate in College Teaching*
Certificate awarded through the Center for Teaching and Learning (CTL) at the University of Colorado, Boulder, for graduate students to develop a firm foundation in college teaching. Completion of the certificate requires two or more semesters of teaching, participation in several CTL workshops, peer and instructor evaluations, and completion of a teaching portfolio. Awarded August, 2022.

2021 *Society for Industrial and Applied Mathematics Travel Award*
Travel award for attendance at the Society for Industrial and Applied Mathematics Conference on Mathematical & Computational Issues in the Geosciences, June 21 – 24, 2021.

2019 *American Meteorological Society Conference Best Student Presentation*
Best student presentation at the 23rd Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS) Conference at the American Meteorological Society Annual Meeting, Phoenix, AZ, 2019.

Teaching Experience

2023 *Instructor* First Semester Calculus (122B)
University of Arizona, September 2023 – December 2023.
Instructor of record for first semester introductory calculus. Lecture-based, in-person course (Monday-Friday). Responsible for teaching material, writing and giving quizzes and exams, hosting office hours.

2020 *Teaching Assistant*
University of Colorado Boulder, August 2018 – May 2019, August 2020 – December 2020.
Teaching assistant for Calculus 1, 2 for Engineers and Teaching Excellence course on teaching pedagogy. Calculus courses required teaching weekly recitations for about 65 students, writing weekly quizzes and worksheets, hosting office hours, grading quizzes, homework, and exams. Teaching Excellence course required lesson planning, running weekly classes. Experience in teaching both in-person and remote classes.

Academic Service, Mentoring, and Scientific Outreach

2023 *Applied Mathematics Graduate Student Mentor*
University of Colorado Boulder, July 2019 – May 2020, July 2021 – May 2022, July 2022 – July 2023
Mentorship program for first year graduate students in the Applied Mathematics Department, providing advice and support through the first year in the program.

2022 *AWM/SIAM Study Session Coordinator*
University of Colorado Boulder, January 2020 – May 2022

One of two coordinators for the Association for Women and Math (AWM)/Society for Industrial and Applied Mathematics (SIAM) study sessions for Calculus 1/2/3 and Differential Equation courses. Includes scheduling facilitators, locations, and times for the study sessions, and helping run both in-person and virtual study sessions.

2021 *Center for Teaching and Learning Lead*
University of Colorado Boulder, May 2020 – May 2021
One of two lead teaching assistants for the Applied Mathematics Department, serving as a resource for department teaching assistants and liaison between department and the Center for Teaching and Learning.

Gilpin, S.: *Mathematics of the atmosphere and how we predict the weather.* Oral Presentation, CU Boulder STEMinar Series, April 6, 2021.

2019 *Graduate School Peer Mentor*
University of Colorado Boulder, August – December 2019
Mentor for a first year PhD physics student, providing support and mentorship through the first semester of graduate school.

SOARS Mentor
UCAR, May – August 2019
Mentor for a SOARS Protegé through the UCAR. Included mentoring in research skills, presenting scientific research, and the graduate school application process.

Professional Development and Workshops

2022 *Transforming Your Research into Teaching (TYRIT) Workshop Series*
University of Colorado Boulder, June–July 2022.
The TYRIT workshop series teaches graduate students how to build a course from the ground up using their PhD research as the motivation for their course. This seven week workshop series was hosted through the Center for the Integration of Research, Teaching and Learning.

2020 **Gilpin, S.** and V. Stout: *Establishing Your Ideal Classroom Climate on Day 1.* Center for Teaching and Learning Fall Intensive, August 20, 2020.

2019 *Joint Effort for Data Assimilation Integration (JEDI) Academy*
University Corporation for Atmospheric Research, Boulder, CO, June 10–13, 2019.
The JEDI Academy Workshop provides an overview and training in the Joint Center for Satellite Data Assimilation's JEDI system. JEDI is a joint effort between several institutions to establish a flexible data assimilation system that accomidates for different models, filters, and observations in a user-friendly environment.

Memberships

2023 *Society for Industrial and Applied Mathematics*
Member of the Society for Industrial and Applied Mathematics (SIAM).