Jonathan Poterjoy *Curriculum Vitae*

Assistant Professor
Department of Atmospheric & Oceanic Science
University of Maryland
4254 Stadium Drive
College Park, MD 20742

Telephone: (301) 405-7567
E-mail: poterjoy@umd.edu
Website: www.poterjoy.com

EDUCATION

Ph.D. in Meteorology, August 2014
The Pennsylvania State University, University Park, PA

B.S. in Meteorology and Applied Mathematics, May 2009 (Magna Cum Laude)
Millersville University of Pennsylvania, Millersville, PA

RESEARCH INTERESTS

Data assimilation, numerical weather prediction, probabilistic forecasting and verification, atmospheric dynamics and predictability, tropical cyclones, and mesoscale meteorology

PROFESSIONAL EXPERIENCE

University of Maryland, Department of Atmospheric and Oceanic Science, College Park, MD
Assistant Professor, August 2018 – present

NOAA Atlantic Oceanographic and Meteorological Laboratory, Hurricane Research Division, Miami, FL
Affiliate, August 2018 – present

NOAA Atlantic Oceanographic and Meteorological Laboratory, Hurricane Research Division, Miami, FL
National Research Council Research Associateship Postdoctoral Fellow, March 2017 – August 2018

Cooperative Institute for Mesoscale Meteorological Studies, **NOAA National Severe Storms Laboratory, and the University of Oklahoma,** Norman, OK
Postdoctoral Research Associate, August 2016 – March 2017

National Center for Atmospheric Research, Boulder, CO
Advanced Study Program Postdoctoral Fellow, August 2014 – August 2016

National Center for Atmospheric Research, Boulder, CO
Graduate Student Visitor, February 2012 – April 2012

The Pennsylvania State University, University Park, PA
Research Assistant, May 2009 – August 2014

REFEREED JOURNAL PUBLICATIONS

Feng, J., X. Wang., and **J. Poterjoy,** 2020: A Comparison of Two Local Moment-Matching Nonlinear Filters: Local Particle Filter (LPF) and Local Nonlinear Ensemble Transform Filter (LNETF). *Mon. Wea. Rev.*, 148, 4377 – 4395.

Poterjoy, J., L. J. Wicker, and M. Buehner, 2019: Progress in the development of a localized particle filter for data assimilation in high-dimensional geophysical systems., *Mon. Wea. Rev.* 147, 1107 – 1126.

Morzfeld, M., D. Hodyss, **J. Poterjoy**, 2018: Variational particle smoothers and their localization, *Quart. J. Roy. Meteor. Soc.* 2018, 144:806 – 825.

Poterjoy, J., R. A. Sobash, and J. L. Anderson, 2017: Convective-scale data assimilation for the Weather Research and Forecasting model using the local particle filter., *Mon. Wea. Rev.,* 145, 1897 – 1918.

Poterjoy, J., and J. L. Anderson, 2016: Efficient assimilation of simulated observations in a high-dimensional geophysical system using a localized particle filter. *Mon. Wea. Rev.*, 144, 2007 – 2020.

Poterjoy, J. and F. Zhang, 2016: Comparison of hybrid four-dimensional data assimilation methods with and without the tangent linear and adjoint models for predicting the life cycle of Hurricane Karl (2010). *Mon. Wea. Rev.* 144, 1449 – 1468.

Poterjoy, J., 2016: A localized particle filter for high-dimensional nonlinear systems. *Mon. Wea. Rev.*, 144, 59 – 76.

Poterjoy, J. and F. Zhang, 2015: Systematic comparison of four-dimensional data assimilation methods with and without a tangent linear model using hybrid background error covariance: E4DVar versus 4DEnVar. *Mon. Wea. Rev.*, 143, 1601 – 1621.

Poterjoy, J. and F. Zhang, 2014: Inter-comparison and coupling of ensemble and four-dimensional variational data assimilation methods for the analysis and forecasting of Hurricane Karl (2010). *Mon. Wea. Rev.*, 142, 3347 – 3364.

Poterjoy, J. and F. Zhang, 2014: Predictability and genesis of Hurricane Karl (2010) examined through the EnKF assimilation of field observations collected during PREDICT. *J. Atmos. Sci.,* 71, 1260 – 1275.

Poterjoy, J., F. Zhang, and Y. Weng, 2014: The effects of sampling errors on the EnKF assimilation of inner-core hurricane observations. *Mon. Wea. Rev.*, 142, 1609 – 1630.

Zhang, X., X.-Y. Huang, L. Yianyu, **J. Poterjoy**, Y. Weng, F. Zhang, and H. Wang, 2014: Development of an efficient regional four-dimensional variational data assimilation system for WRF. *J. Atmos. Oceanic Technol.*, 31, 2777 – 2794.

Zhang, F., M. Zhang, and **J. Poterjoy**, 2013: E3DVar: Coupling an ensemble Kalman filter with three-dimensional variational data assimilation in a limited-area weather prediction model and comparison to E4DVar. *Mon. Wea. Rev.*, 140, 900 – 917.

Xie, B., F. Zhang, Q. Zhang, **J. Poterjoy**, and Y. Weng, 2013: Observing strategy and observation targeting for tropical cyclones using ensemble-based sensitivity analysis and data assimilation. *Mon. Wea. Rev.*, 141, 1437 – 1453.

Poterjoy, J. and F. Zhang, 2011: Dynamics and structure of forecast error covariance in the core of a developing hurricane. *J. Atmos. Sci.,* 68, 1586 – 1606.

MANUSCRIPTS SUBMITTED OR IN PROGRESS

Poterjoy, J.: Localized Particle Filtering for Problems with Large Sampling Error. *Under revision.*

Poterjoy, J., G. Alaka, H. Winterbottom: The irreplaceable utility of sequential data assimilation for model development: Lessons learned from an experimental HWRF system. *Under revision.*

Kurosawa, K. and **J. Poterjoy**: Data assimilation challenges posed by nonlinear operators: A comparative study of ensemble and variational filters and smoothers. *Under revision.*

Reyes, A., G. Jenkins, **J. Poterjoy**, and F. Zhang: A Multiple-scale Analysis on the Predictability and Genesis of Hurricane Karl (2010) and Tropical Storm Matthew (2010) Evaluated Through a Coupled EnKF and 4Dvar Data Assimilation Method. *Submitted.*

Poterjoy, J. Multivariate Non-Gaussian Data Assimilation for Synoptic-scale Weather Prediction. *In progress.*

INVITED CONFERENCE AND WORKSHOP PRESENTATIONS

- A Case for Classic, No Frills, Adjoint-Based Ensemble 4DVar, *34th Conference on Hurricanes and Tropical Meteorology*, Virtual meeting, 2021
- Tempered and Hybrid Particle Filter Methodology for Geophysical Data Assimilation, *25th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, AMS Annual Meeting,* Virtual meeting, 2021
- Particle Filter-based Data Assimilation for Numerical Weather Prediction, *1st International Workshop in Data Assimilation*, Medellín, Columbia, 2019
- Benefits of a Localized Particle Filter Explored Using the AOML-UMD Ensemble Prediction System, *International Union of Geodesy and Geophysics General Assembly,* Montreal, Canada, 2019
- Regional Weather Prediction Using the Local Particle Filter in an Experimental HWRF Modeling System*, 2nd ADAPT Symposium on "Advanced Understanding, Monitoring and Prediction of Weather, Climate and Environmental systems," State College, PA, 2018*
- Regional Weather Forecasting Using the Local Particle Filter, 5th *International Workshop on Nonhydrostatic Models,* Tokyo, Japan, 2018
- Toward the Application of Particle Filters for Numerical Weather Prediction and Research, *The 8th Ensemble Kalman Filtering Workshop,* Sainte-Adele, Canada, 2018
- Localized Particle Filters for Weather Prediction and Research*, National Strategic Computing Initiative Workshop*, Arlington, VA, 2017
- Storm-Scale Weather Analysis and Prediction at the NOAA National Severe Storms Laboratory Using a Non-Gaussian Filter, 3rd *RIKEN International Symposium on Data Assimilation*, Kobe, Japan, 2017
- Probabilistic Weather Analysis and Prediction Using the Local Particle Filter, *Advances in Data Assimilation, Predictability, and Uncertainty Quantification, American Geophysical Union Fall Meeting,* San Francisco, CA, 2016
- Efficient Assimilation of Observations via a Localized Particle Filter in High-Dimensional Geophysical Systems, *Perspectives on Model-informed Data Assimilation, SIAM Conference on Uncertainty Quantification*, Lausanne, Switzerland, 2016
- Hybrid Four-Dimensional Data Assimilation with and without Tangent Linear Model Operators. *6th EnKF Workshop*, Buffalo, NY, 2014

INVITED LECTURES

- Big Data, Very Big Computers, and the Endless Pursuit for an "Honest" Weather Prediction System. *University of Delaware, Department of Geography*, Wilmington, DE, 2019
- Bayesian Data Assimilation Within a Regional Modeling Framework. *German Meteorological Service Seminar*, Offenbach, Germany, 2019
- From Toy Models to NWP: Leveraging HWRF for Data Assimilation Development. *NOAA Hurricane Weather Research and Forecasting Model Seminar*, College Park, MD, 2019
- Big Data, Very Big Computers, and the Endless Pursuit for an "Honest" Weather Prediction System, *Department of Meteorology, Millersville University,* Millersville, PA, 2019
- Progress in the Development of a Localized Particle Filter for Weather Prediction, *Earth System Science Interdisciplinary Center*, College Park, MD, 2019
- Progress in the Development of a Localized Particle Filter for Regional Weather Prediction, *NASA Goddard, Global Modeling and Assimilation Office,* Greenbelt, MD, 2018
- Progress in the Development of a Localized Particle Filter for Numerical Weather Prediction and Research, *Japan Meteorological Agency, Meteorological Research Institute,* Tokyo, Japan, 2018
- Nonlinear Data Assimilation for Geophysical Analysis, Prediction, and Research, *North Carolina State University, Department of Marine, Earth, and Atmospheric Sciences,* Raleigh, NC, 2017.

- Progress in the Development of a Localized Particle Filter for Atmospheric Analysis, Prediction, and Research, *University of Maryland, Department of Atmospheric and Oceanic Science*, College Park, MD, 2017
- Nonparametric Data Assimilation for Weather Research and Forecasting, *University of Miami, Department of Computer Science,* Miami, FL, 2017
- Storm-Scale Weather Analysis and Prediction Using a Nonparametric Filter, *University of Arizona, Department of Mathematics*, Tucson, AZ, 2016
- Progress Toward the Development of a Nonlinear Filter for High-Dimensional Data Assimilation in Geoscience, *Penn State University, Center for Advanced Data Assimilation and Predictability Techniques*, University Park, PA, 2016
- Hybrid and Coupling of Ensemble and Variational Data Assimilation: An Informative Comparison of Adjoint- and Ensemble-Based Four-Dimensional Strategies, *Penn State University, Center for Advanced Data Assimilation and Predictability Techniques*, University Park, PA, 2016
- Probabilistic Storm-Scale Analysis and Prediction Using a Nonparametric Ensemble Filter: Implications for Tropical Cyclone Forecasting, *NOAA Atlantic Oceanographic and Meteorological Laboratory,* Miami, FL, 2016
- An Efficient Nonparametric Data Assimilation Method for Atmospheric Research and Ensemble Forecasting. *National Weather Center*, Norman, OK, 2016
- Efficient Nonparametric Data Assimilation for Atmospheric Research and Prediction. *Florida State University, Department of Earth, Ocean and Atmospheric Science*, Tallahassee, FL, 2016
- A Localized Particle Filter for Data Assimilation in High-dimensional Nonlinear Systems. *STATMOS Summer School in Data Assimilation,* Boulder, CO, 2015
- Hybrid and Coupling of Ensemble and Variational Data Assimilation. 12th *CAS-TWAS-WMO Forum: Data Assimilation Summer School*, Beijing, China, 2015
- Introduction to NCAR Data Assimilation Research Testbed (DART). 12th *CAS-TWAS-WMO Forum: Data Assimilation Summer School*, Beijing, China, 2015
- A Localized Particle Filter for Large Dimensional State Estimation. 12th *CAS-TWAS-WMO Forum: Coupled Data Assimilation Symposium,* Beijing, China, 2015
- Can We do Better Than the Kalman Filter? A Localized Particle Filter for Large Dimensional State Estimation. *Peking University, Department of Atmospheric and Oceanic Sciences*, Beijing, China, 2015
- A Localized Particle Filter for Large Dimensional State Estimation. *Chinese Academy of Meteorological Sciences,* Beijing, China, 2015
- A Localized Particle Filter for High-dimensional Nonlinear Systems. *Cooperative Institute for Research in the Atmosphere,* Fort Collins, CO, 2015
- Ensemble Filtering for Large-Dimensional Nonlinear Systems. *Penn State University, Department of Statistics*, University Park, PA, 2014
- Hybrid Data Assimilation for Tropical Cyclone Analysis and Prediction. *Stony Brook University, Department of Marine and Atmospheric Sciences*, Stony Brook, NY, 2014.

AWARDED GRANTS

Improving Convective-Scale Weather Prediction through Advanced Bayesian Filtering, Verification, and Uncertainty Quantification. **PI: J. Poterjoy**, NSF-CAREER, $548,222, 3/29/2019 – 3/30/2024.

Improving Hurricane Predictions Through Advanced Data Assimilation, Ensemble Forecasting, and Observing System Design. **PI: J. Poterjoy**. NOAA, $137,602, 7/1/2019 – 6/30/2022.

HU-2 Accelerate the Development of the Hurricane Analysis and Forecasting System (HAFS). **PI: J. Poterjoy**. NOAA, $250,000, 7/1/2020 – 7/1/2022.

HPC Computing Proposal: Bayesian filtering for Convective-scale Weather Prediction Through Large Monte Carlo Simulations. **PI: J. Poterjoy**, NCAR/CISL, 17.2 M core hours, 10/20/2020 – 3/30/2024.

ADVISING

Joshua McCurry, PhD student (UMD), 2019 – present
Kenta Kurosawa, PhD student (UMD), 2019 – present
Andrew Walsworth, PhD student (UMD), 2019 – present
Joeseph Knisely, PhD student (UMD), 2020 – present
Craig Schwartz, PhD student (UMD), 2020 – present
Charles Kropiewnicki, Undergrad senior thesis (UMD), 2020 – present
Gavin Harrison, Undergrad senior thesis (UMD), 2020 – present
Katriella Tenembaum, Undergrad senior thesis (UMD), 2019 – 2020
Title: "*Exploring Imbalance Introduced by EnKFs in Tropical Cyclone Analyses*."
Audrey Nash, Undergrad senior thesis (UMD), 2019 – 2020
Title: "*Forecast Challenges Posed by Convective Outbreaks Associated with Landfalling Hurricanes*."

UNIVERSITY TEACHING

Instructor, University of Maryland, AOSC 470/600, *Synoptic Meteorology,* Fall 2019 and 2020

- This class is taught concurrently at the undergraduate and graduate level.
- General topics covered in class: numerical modeling and observational analysis, data assimilation, review of atmospheric governing equations, quasi-geostrophic theory, frontogenesis, extratropical waves and cyclones, weather map discussions

Instructor, University of Maryland, AOSC 472/602, *Mesoscale Meteorology,* Fall 2019

- This class is taught concurrently at the undergraduate and graduate level.
- General topics covered in class: mesoscale instabilities, the planetary boundary layer, mesoscale air mass boundaries, convective initialization, convective organization, mesoscale convective systems, tornadoes and extreme rainfall

Co-Instructor, Pennsylvania State University, METEO 597B, *Data Assimilation*, Spring 2013

- Lecture topics: optimal interpolation, EnKF, 3DVar, 4DVar, adjoint sensitivity analysis, ensemble sensitivity analysis, observation impact, parameter estimation, and hybrid data assimilation
- Additional tasks: assisted in the development of the course curriculum, and constructed and graded programming lab assignments

Guest Lecturer, University of Oklahoma, METR 6313, *Advanced Topics in Data Assimilation*, Spring 2017

- Lecture topics: Introduction to particle filters and the local particle filter

Guest Lecturer, Pennsylvania State University, METEO 526, *Numerical Weather Prediction*, Spring 2011

- Lecture topics: Ensemble Kalman filters and Lorenz (1963) model tutorial

Teaching Assistant, Pennsylvania State University, METEO 474, *Computer Methods in Meteorological Analysis and Forecasting,* Spring 2011

- Lab assistant for an undergraduate data mining course
- Tasks: graded labs, answered questions from students, and organized a capstone project

HONORS AND AWARDS

- National Science Foundation CAREER Award, 2019
- National Research Council Postdoctoral Fellowship, NOAA Atlantic Oceanographic and Meteorological Laboratory, 2017 – 2018
- Advanced Study Program Postdoctoral Fellowship, National Center for Atmospheric Research, 2014 – 2016

PROFESSIONAL ACTIVITIES

- Associate editor, AMS Monthly Weather Review, 2016 – present
- Associate editor, AGU Journal of Advances in Modeling Earth Systems, 2021 – present
- Member, University of Maryland Burgers Program, 2020 – present
- Member, NCAR High Performance Computing User group 2021 – present
- Organizing committee member, *8th EnKF Workshop*, Sainte-Adele, Canada, 2018
- Invited speaker, *NSF "National Strategic Computing Initiative" meeting*, Arlington, VA, 2017
- Organizing committee member, *7th EnKF Workshop*, University Park, PA, 2016
- Lecturer, *CAS-TWAS-WMO Data Assimilation Summer School*, Beijing, China, 2015
- Lecturer, *STATMOS Summer School in Data Assimilation,* Boulder, CO, 2015
- Co-author, *8th International Workshop on Tropical Cyclones: Subtopic 4.3 – structure change forecasting*, 2014
- Invited speaker, *NSF "Big Weather" workshop*, Boulder, CO, 2014
- Reviewer for several scientific journals, including *Advances in Atmospheric Science, Advances in Meteorology, Atmospheric Research, Journal of Advances in Modeling Earth Systems, Journal of Applied Meteorology and Climatology, Journal of Atmospheric Sciences, Journal of Climate, Journal of Geophysical Research – Atmospheres, Monthly Weather Review, Physica D: Nonlinear Phenomenon, Ocean Dynamics, Natural Hazards, Quarterly Journal of the Royal Meteorological Society, Tellus A: Dynamic Meteorology and Oceanography, Weather and Forecasting, Journal of Applied Mathematics and Computation, and Journal of the Meteorological Society of Japan*.
- Primary developer of the local particle filter, a nonlinear data assimilation technique available freely through the open source NCAR Data Assimilation Research Testbed (DART) software package
- Lead developer of the AOML-UMD ensemble prediction system, a research testbed for modeling and data assimilation research with the HWRF model

DEPARTMENT SERVICE (UMD AOSC)

- Chair, Graduate Admissions Committee, 2019 – present
- Member, Undergraduate Curriculum Committee, 2020 – present
- Voting Representative, UMD University Corporation for Atmospheric Research (UCAR), 2019 – present
- Co-author, UMD proposal for entrance into American Geophysical Union BRIDGE Program
- Advisor, University of Maryland Numerical Weather Prediction Club, 2020 – present