

# Michael J. Erickson

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(518) 791-2188

## Work Address:

WPC: 5830 University Research Ct  
College Park, MD 20740

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## Education

### **Stony Brook University, Stony Brook, NY**

**May 2015**

Ph.D. Marine and Atmospheric Sciences

Dissertation: *Exploring Model Error through Post-processing and an Ensemble Kalman Filter on Fire Weather Days*

Advisor: Prof. Brian A. Colle

### **Stony Brook University, Stony Brook, NY**

**July 2007**

Master of Science. Marine and Atmospheric Sciences

Thesis: The Influence of the North Atlantic Oscillation on Cod Recruitment.

Advisor: Prof. Sultan Hameed

### **Western Connecticut State University, Danbury, CT**

**May 2003**

Bachelor of Arts. Meteorology

GPA: 3.83/4.0

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## Professional Experience

### **Research Scientist II**

University of Colorado

May 2019 – Present

Weather Prediction Center, College Park, MD,

### **Research Scientist I**

University of Colorado

Feb 2016 – Apr 2019

Weather Prediction Center, College Park, MD,

### **Visiting Assistant Professor**

AOSC 470/600 (Synoptic Meteor)

Aug 2018 – Dec 2018

University of Maryland, College Park, MD

### **Postdoctoral Associate**

Advisor: Brian Colle

May 2015 – Feb 2016

Stony Brook University, Stony Brook, NY

### **Adjunct Instructor**

MET 101 (Intro. to Weather)

Fall 2012 – Dec 2015

Suffolk County Community College, Selden, NY

### **Research Assistant**

Advisor: Brian Colle

Fall 2007- May 2015

Stony Brook University, Stony Brook, NY

### **Research Assistant**

Advisor: Sultan Hameed

May 2004 – July 2007

Stony Brook University, Stony Brook, NY

**Teaching Assistant** Full TA: Fall 2004, 2006, 2007, Spring 2005, 2007  
ATM 102 (Weather and Climate) Stony Brook University, Stony Brook, NY

**Teaching Assistant** Full TA: Spring 2008.  
ATM 247 (Atmos. Structure/Analy) Stony Brook University, Stony Brook, NY

**Private Tutor** Spring 2006 – Fall 2011  
Integrated Algebra, Geometry, Trig. Long Island Area, NY

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## Research Interests

- Ensemble model verification, post-processing, and calibration
  - Object-based tracking, verification, and post-processing of heavy precipitation
  - Novel methods for evaluating Weather Prediction Center (WPC) forecast products
  - Development of a flash flood climatology
  - Numerical modeling using the Weather Research and Forecasting (WRF) model and data assimilation using the Ensemble Kalman Filter (EnKF)
  - Investigating fire weather days from an atmospheric ensemble modeling perspective
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## Skills and Qualifications

- Computer Languages: Python, MATLAB, Linux shell scripting, FORTRAN, GEMPAK, HTML, PHP, Javascript, KMZ
- Knowledgeable with the Model Evaluation Tools (MET) software
- Knowledgeable in running/adapting the Weather Research and Forecasting (WRF) model including the WRF Preprocessing system (WPS)
- Knowledgeable with data assimilation, including WRF Data Assimilation system (WRFDA), the WRF Boundary Condition (WRF\_BC) and the Pennsylvania State University Ensemble Kalman Filter
- Strong background in statistics. Familiar with model verification, post-processing, EOF analysis, cluster analysis, and Bayesian techniques.
- Comfortable with analyzing large ensemble model (SREF, GEFS, FNMOC, CMC) and analysis (RUC, RAP, NARR) datasets in NetCDF, GRIB, GRIB2 and ASCII
- Familiar with proposal writing and project management
- Familiar with designing operational websites to display compact novel visualizations of ensemble model data
- Knowledgeable with UNIX/LINUX, Windows and Mac OS
- Familiar with Microsoft Word, Excel and Power Point
- Collaboration with many different agencies (National Weather Service, Earth System Research Laboratory, National Center for Atmospheric Research, River Forecast Centers, New York State Energy Research and Development Authority, United States Forest Service, Consolidated Edison of New York, National Severe Storms Laboratory, Oklahoma University, Colorado State University, University of Maryland, University of Florida) on research to operations projects

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## Research to Operation Projects since 02/2016

### **Displaying Heavy Precipitation Object-based Biases for WPC Forecasters**

*June 2018 – Present*

- Track and compare observed and modeled heavy precipitation objects (heavy rain and snowbands) to assess bias and uncertainty
- Create operational websites to display modeled heavy precipitation objects
- Link operational heavy precipitation objects to similar retrospective objects

### **Supporting and Creating a Verification Platform for WPC Forecast Products**

*May 2018 – Present*

- Verify the Weather Prediction Center Excessive Rainfall Outlook and Mesoscale Precipitation Discussion using a series of metrics to assess bias and skill
- Develop an observational proxy (Practically Perfect) allowing forecasters to evaluate their skill for individual events
- Create and supervise the development of a website for WPC forecasters

### **Utilizing heavy rain object displacement in Hydrological Modeling Applications**

*Sept 2018 – Present*

- Utilize uncertainty and bias of heavy precipitation object-based biases in hydrological modeling applications

### **Supporting WPC's Flash Flood and Intense Rainfall (FFaIR) Experiments**

*June 2017 – Present*

- Provide experimental guidance tools in advance of FFaIR
- Verify the forecast products and guidance used during the experiment

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## Additional Development Projects since 02/2016

### **Development of a First-guess Field for the WPC Excessive Rainfall Outlook**

*June 2018 – Feb 2021*

- Create a First-guess field to serve as a starting point for forecasters
- Improve the First-guess field using verification and calibration methods

### **Coupling a Hydrologic Model to an Ensemble of Heavy Precipitation Forecasts**

*May 2017 – Aug 2018*

- Test the utility of an ensemble of precipitation forecasts coupled to a hydrologic model for three historical flooding events
- Collaborate with the hydrologic model developers on future products

### **Development of a Contiguous United States Flash Flood Climatology**

*Feb 2016 – May 2018*

- Develop a flash flood climatology for the Contiguous United States, using bias correction techniques, observations, and a 10-year model climatology

## Verification of WPC Forecast Products

*Feb 2017 – Feb 2018*

- Perform a 3-year retrospective verification (2015 to 2017) of the Weather Prediction Center Excessive Rainfall Outlook to assess skill
  - Redefine the Excessive Rainfall Outlook definition operationally in October 2017
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## Publications (In Preparation)

Green, M., B. Veenhuis, **M.J. Erickson**, and J.A. Nelson, 2022: Development of a calibrated PQPF for Heavy Tropical Precipitation. Target Journal: *Wea. Forecasting*.

Yussouf, N., P.S. Skinner, B. Matilla, **M.J. Erickson**, T. Jones, J. Hu, K.H. Knopfmeier, J. Choate, P. Heinselman, T. Alcott, D. Dowell, B. Albright, S. Perfater, J.A. Nelson, G. Creager, T. Ladwig, A. Reinhart, 2022: Evaluation of Warn-on-Forecast System in NOAA Hydrometeorology Testbed 2018 Flash Flood and Intense Rainfall Experiment. Target Journal: *Wea. Forecasting*.

**Erickson, M.J.**, N. Yussouf, P.S. Skinner, and K.A. Wilson, 2021: Tracking and Assessing Heavy Precipitation Object-Based Biases from the 2019 and 2020 Warn on Forecast System. Target Journal: *Wea. Forecasting*.

**Erickson, M.J.** and J.A. Nelson, 2021: Analyzing Paired Heavy Precipitation Object Biases from the High-Resolution Rapid Refresh Model Using MET MODE. Target Journal: *Wea. Forecasting*.

**Erickson, M.J.** and J.A. Nelson, 2021: Developing a Heavy Precipitation Object Tracker for the High-Resolution Rapid Refresh Model Using MET MODE. Target Journal: *Wea. Forecasting*.

Burke, P.C., A. Lamers, G.W. Carbin, **M.J. Erickson**, M. Klein, M. Chenard, 2021: The Modern Excessive Rainfall Outlook at the Weather Prediction Center. Target Journal: *BAMS*.

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## Publications

Williamson, M., K. Ash, **M. J. Erickson**, E. Mullens, 2022: Damages Associated with Excessive Rainfall Outlooks (ERO) and Missed Flash Floods. *Submitted to Wea. Forecasting*.

Schumacher, R.S., A.J. Hill, M. Klein, J.A. Nelson, **M. J. Erickson**, S.M. Trojniak, G.R. Herman, 2021: From Random Forests to Flood Forecasts: A Research to Operations Success Story. *BAMS*, **102** (9), 1742-1755.

**Erickson, M.J.**, B. Albright, and J.A. Nelson, 2021: Verifying and Redefining the Weather Prediction Center's Excessive Rainfall Outlook Forecast Product. *Wea. Forecasting*, **36**, 325-340.

**Erickson, M. J.**, J. S. Kastman, B. Albright, S. Perfater, J. A. Nelson, R. S. Schumacher, and G. R. Herman, 2019: Verification Results from the 2017 HMT-WPC Flash Flood and Intense Rainfall Experiment. *J. Appl. Meteor. Climatol.*, **58**, 2591–2604.

**Erickson, M.J.**, J. Charney, and B. A. Colle, 2018: Evaluation and Post-Processing of Ensemble Fire Weather Predictions over the Northeast United States. *J. Appl. Meteor. Climatol.*, **57**, 1135-1153.

**Erickson, M.J.**, J. Charney, and B. A. Colle, 2016: Development of a Fire Weather Index Using Meteorological Observations within the Northeast United States. *J. Appl. Meteor. Climatol.*, **55**, 389-402.

Hodrefe, C, P. Doraiswamy, B. Colle, K. Demerjian, W. Hao, **M.J. Erickson**, M. Souders, and J-Y Ku, 2014: Meteorology, Emissions, and Grid Resolution: Effects on Discrete and Probabilistic Model Performance. In: D. Steyn, P. Builtjes, R. Timmermans (eds.): Air Pollution and Modeling and Its Application XXII, NARA Science for Peace and Security Series C: Environmental Security, 493-497. Springer Netherlands.

**Erickson, M.J.**, B. A. Colle, and J. Charney, 2012: Impact of bias correction type and conditional training on Bayesian model averaging over the northeast United States. *Wea. Forecasting*, **27**, 1449-1469.

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## Presentations and Seminars since 2015

***Bold** indicates presenter*

**Erickson, M.J.**, W. Diment, J.A. Nelson, and M. Klein. “A New Dynamic Flash Flood Reports Page for Public Use.” 11<sup>th</sup> Conference on Transition of Research to Operations. January 2021. Virtual. (Oral Presentation).

**Erickson, M.J.**, N. Yussouf, P.S. Skinner, and K.A. Wilson. “Assessing and Displaying Object-based Precipitation Biases from NSSL’s Warn-on-Forecast Ensemble.” 11<sup>th</sup> Conference on Transition of Research to Operations. January 2021. Virtual. (Oral Presentation).

**Erickson, M.J.** “The Weather Prediction Center’s Snowband Probability Prototype Page.” 2020/21 Winter Weather Experiment (WWE) Presentation. Dec 2020. Virtual. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. “Utilizing a ‘Practically Perfect’ Tool for both Verification and Forecasting of Excessive Rainfall Outlooks.” CIRES Rendezvous Poster Session. August 2020. Virtual. (Poster Presentation).

**Erickson, M.J.**, N. Yussouf, P.S. Skinner, and K.A. Wilson. “Object-based Verification of NSSL’s Warn-on-Forecast Ensemble during the 2019 Warm Season.” 1<sup>st</sup> Annual Unified Forecast System Workshop. July 2020. Virtual. (Oral Presentation).

**Erickson, M.J.**, B. Albright, and J.A. Nelson. "Development of a WPC Excessive Rainfall Outlook "Practically Perfect" Tool for Verification and Forecasting." 1<sup>st</sup> Annual Unified Forecast System Workshop. July 2020. Virtual. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Development and Usage of the Heavy Precipitation Object Tracker (HPOT)." 2020 Flash Flood and Intense Rainfall Experiment (FFaIR) Presentation. July 2020. College Park, MD (Oral Presentation).

**Erickson, M.J.**, N. Yussouf, P.S. Skinner, and K.A. Wilson. "Tracking and Verifying Heavy Precipitation Objects from NSSL's Warn-on-Forecast Ensemble." 10<sup>th</sup> Conference on Transition of Research to Operations. January 2020. Boston, MA. (Oral Presentation).

**Erickson, M.J.**, B. Albright, and J.A. Nelson. "Development of a WPC 'Practically Perfect' Verification as a Product for the Excessive Rainfall Outlook." 10<sup>th</sup> Conference on Transition of Research to Operations. January 2020. Boston, MA. (Oral Presentation).

**Erickson, M.J.** "An ERO First Guess Field based on WPC PQPF." WPC Internal Seminar. December 2019. College Park, MD (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Tracking and Usage of Ensemble Model Heavy Precipitation Objects at the Weather Prediction Center." 8th NCEP Ensemble User Workshop. August 2019. College Park, MD (Oral Presentation).

**Erickson, M.J.** "A New Practically Perfect Technique Used in FFaIR." 2019 Flash Flood and Intense Rainfall Experiment (FFaIR) Presentation. June 2019. College Park, MD (Oral Presentation).

**Erickson, M.J.** "Development and Applications of a new Practically Perfect Technique for WPC." WPC Internal Seminar. May 2019. College Park, MD (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Ways to Analyze Model Object-Oriented Heavy Precipitation Biases at the Weather Prediction Center." Global Systems Division Seminar. April 2019. Boulder, CO. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Verifying and Utilizing Seasonal Object Oriented Biases in Convection Allowing Models." 9<sup>th</sup> Conference on Transition of Research to Operations. January 2019. Phoenix, AZ. (Oral Presentation).

**Erickson, M.J.**, B. Albright, and J.A. Nelson. "Excessive Rainfall Outlook Verification Product for WPC Forecasters." 9<sup>th</sup> Conference on Transition of Research to Operations. January 2019. Phoenix, AZ. (Oral Presentation).

**Erickson, M.J.**, S.A. Ganetis, and J. Kastman. "METplus Usage at the Weather Prediction Center." Invited talk at the Model Evaluation Tools Plus (METplus) Tutorial. October 2018. College Park, MD (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Novel Ways To Access and Visualize Model Biases at the Weather Prediction Center." 7<sup>th</sup> Tri-State Weather Conference. September 2018. Danbury, CT. (Oral Presentation).

**Erickson, M.J.**, J.A. Nelson, M. Klein, and D. Novak. "Calibrated Probabilistic Guidance for Flash Flood Hazards." 3<sup>rd</sup> "Probability of What?" Annual Meeting. September 2018. Norman, Oklahoma. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Evaluating Object-Oriented Bias and Error in HRRR Heavy Precipitation Objects to Assist Weather Prediction Center Forecasters." Invited talk for the NOAA/National Severe Storms Laboratory Seminar. May 2018. Norman, OK (Oral Presentation).

**Erickson, M.J.** "Verifying the Excessive Rainfall Outlook Over the Past Three Years." WPC Internal Seminar. April 2018 and June 2018. College Park, MD (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Verifying, Calibrating, and Redefining the Excessive Rainfall Outlook at the Weather Prediction Center." 8<sup>th</sup> Conference on Transition of Research to Operations. January 2018. Austin, TX. (Oral Presentation).

**Erickson, M.J.**, S.A. Ganetis, H. Vergara-Arrieta, and J.A. Nelson. "Using High Resolution Ensemble Precipitation Data to Develop New Probabilistic Hazard Information at the Weather Prediction Center." 8<sup>th</sup> Conference on Transition of Research to Operations. January 2018. Austin, TX. (Oral Presentation).

**Perfater, S., B. Albright, J. Kastman, and M.J. Erickson.** "The 2017 Flash Flood and Intense Rainfall Experiment: Results and Findings." EMC Model Evaluation Group Weekly Presentation. November 2017. College Park, MD (Oral Presentation).

**Erickson, M.J.**, S.A. Ganetis, and J. Kastman. "Usage of Model Evaluation Tools at the Weather Prediction Center." Invited talk at the Model Evaluation Tools Tutorial. October 2017. College Park, MD (Oral Presentation).

**Erickson, M.J.** "An Ensemble Cyclone Track Website for Conveying Uncertainty and Model Trends." WPC Internal Seminar. September 2017. College Park, MD (Oral Presentation).

**Erickson, M.J.**, J.A. Nelson and D. Novak. "Calibrated Probabilistic Guidance for Flash Flood Hazards" 2<sup>nd</sup> "Probability of What?" Annual Meeting. September 2017. Norman, Oklahoma. (Oral Presentation).

**Erickson, M.J.** "Tracking and Displaying Heavy Rain Objects Using MODE Time-Domain." Student Intern Brown Bag Presentation. June 2017. College Park, MD. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Development of a Gridded Flash Flood Climatology for Use by the Weather Prediction Center." 7<sup>th</sup> Conference on Transition of Research to Operations. January 2017. Seattle, WA. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "New Ways of Displaying Convection Allowing Ensemble Data for WPC Forecasters." 7<sup>th</sup> Conference on Transition of Research to Operations. January 2017. Seattle, WA. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Development of New Probabilistic Hazard Information Using High Resolution Quantitative Precipitation Forecasts." 6<sup>th</sup> Tri-State Weather Conference. October 2016. Danbury, CT. (Oral Presentation).

**Erickson, M.J.** and J.A. Nelson. "Calibrated Probabilistic Guidance for Flash Flood Hazards: An Update." 1<sup>st</sup> "Probability of What?" Annual Meeting. August 2016. Norman, Oklahoma. (Oral Presentation).

**Erickson, M.J.**, B.A. Colle, and B. Hertell. "Development of a Website to Diagnose Ensemble Cyclone Track Uncertainty with Additional Supporting Graphics." National Weather Service Northeast Regional Operational Workshop. November 2015. Albany, NY. (Oral Presentation).

**Erickson, M.J.** "Demonstration of the Operational Ensemble Cyclone Tracks Website." Invited Webinar Talk for the National Weather Service Alaska Region, Sept 2015. Fairbanks, Alaska. (Virtual Oral Presentation).

**Erickson, M.J.**, and B.A. Colle. "Using the Ensemble Kalman Filter on Fire Weather Days to Explore Model Error over the Northeast United States." AMS 23<sup>rd</sup> Conference on Numerical Weather Prediction. July 2015. Chicago, IL (Oral presentation).

**Erickson, M.J.**, B.A. Colle., R.D. Torn, E.K.M Chang, M. Zhang, J.J. Charney. "Exploring Model Error through Post-processing and an Ensemble Kalman Filter on Fire Weather Days." Ph.D Dissertation. May 2015. Stony Brook, NY (Oral presentation).

**Erickson, M.J.**, and B.A. Colle. "Exploring Ensemble Kalman Filter Performance on Fire Weather Days over the Northeast United States." 11<sup>th</sup> Symposium on Fire and Forest Meteorology. May 2015. Minneapolis, MN. (Oral Presentation).

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## Current Funding

(1) Title: Accelerate Improvements in Prediction of Extreme Precipitation.  
Supporting Agency: National Oceanic and Atmospheric Administration  
Investigator months: 9 months/year  
Total Project Amount: \$716,231 (Total; Awarded).  
Duration: August 1, 2019 – July 31, 2023.

(2) Title: Evaluation/Development Guide for Tropical Cyclone Rainfall in High Terrain.  
Supporting Agency: National Oceanic and Atmospheric Administration  
Investigator months: 0.3 months/year  
Total Project Amount: \$239,683 (Total; Awarded).  
Duration: Sept 1, 2019 – Aug 31, 2022.

(3) Title: Enhancing Feature Driven Evaluation of High Impact Hydrometeorology Events through METplus  
Supporting Agency: Joint Training Transformation Initiative  
Investigator months: 1 months/year  
Total Project Amount: \$45,998 (Total; Awarded)  
Duration: Aug 1, 2021 – Jul 31, 2023



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## Community/Professional Service

<b>Member</b>	WPC Rainfall Services Team (2018 – present)
<b>Participant</b>	2018 Hazardous Weather Testbed Created experimental forecast products related to severe wind, hail, and tornadoes. Norman, OK
<b>Co-Lead</b>	2018 DTC Community UFS Test Plan and Metrics Workshop Co-lead/Scribe for Convection-Allowing Models Test Plan Break-out Group. College Park, MD
<b>Journal Reviewer</b>	<i>Journal of Atmospheric and Oceanic Technology</i> <i>Journal of Applied Meteorology and Climatology</i> <i>Journal of Hydrometeorology</i> <i>Journal of Operational Meteorology</i> <i>Weather and Forecasting</i> <i>MDPI Forecasting, Atmosphere, Climate, Remote Sensing, Sustainability, and Forests</i>
<b>Student</b>	<i>Management Concepts – Leadership Skills and Techniques</i> 30 Oct to 01 Nov 2019
<b>Session Chair</b>	<i>11<sup>th</sup> Symposium on Fire and Forest Meteorology (2015)</i> <i>9<sup>th</sup> to 11<sup>th</sup> Conference on Transition of R20 (2019-2021)</i>
<b>Training</b>	<b>CIRES Proposal Training Session (1.5 hours)</b> 09 September 2020
<b>Training</b>	<b>CIRES Supervisor Training (4 sessions at 1 hour each)</b> 14 July 2020, 21 July 2020, 28 July 2020, 04 August 2020
<b>Mentoring</b>	<b>NCWCP, College Park, MD</b> <b>William Lapenta Student Internship Program</b>  Austin Jerke                                  June 2021 to August 2021 <i>Exploring Object-Based Biases in Weather Prediction Center's Excessive Rainfall Outlook</i>  Christina Comer                                June 2020 to August 2020 <i>Object-based biases in WPC's Excessive Rainfall Outlook</i>  <b>University of Maryland, College Park, MD</b> <b>AOSC493/494 – Senior Research Project</b>



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## Professional Affiliations

Member of the American Meteorological Society.	1999-present
Member of the Hera Group. Student Club.	2007-2010
Member of the Meteorology Club. Student Club.	1999-2003

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## Awards and Honors

<b>Best New Organization Award:</b> The Hera Group. Stony Brook University, Stony Brook, NY.	2008
<b>B.A. Magna Cum Laude with Honors</b>	2003
<b>Dean's Choice Award</b> Western Connecticut State University, Danbury, CT.	2003
<b>Jonathan Mottley Memorial Scholarship</b> Western Connecticut State University, Danbury, CT.	2002
<b>Earth and Planetary Sciences Award</b> Western Connecticut State University, Danbury, CT.	2001
<b>Meserve Memorial Scholarship</b> Western Connecticut State University, Danbury, CT.	1999-2003