CURRICULUM VITAE

Kelly M. Mahoney
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1. EMPLOYMENT

Meteorologist — November 2015 – present
(40 hours/week)

National Oceanic and Atmospheric Association
Earth System Research Lab
Physical Sciences Division

- Design and lead independent and interdisciplinary team-directed research in NOAA ESRL's Physical Science Division related to extreme precipitation and flooding across broad range of time and space (synoptic- and mesoscale) scales using high-resolution numerical models, and various observational and model-based datasets;
- Lead studies of extreme precipitation in future climates in the complex terrain of mountainous regions by downscaling large-scale climate models to basin-scale or higher resolutions; relate results to climate model physical parameterization scheme areas of potential improvement and to the needs of operations/applications-based partners;
- Conduct case studies of extreme precipitation events to diagnose key physical processes and the potential for improved predictive understanding of extreme weather events including cool season, warm season, and tropical phenomena;
- Lead multi-disciplinary teams toward synthesis of research into meaningful local, regional, national and international refereed scientific publications, presentations, and stakeholder-valued operations and applications;
- Serve as a liaison between NOAA and state and local government agencies; the U.S. Bureau of Reclamation (USBR) and the U.S. Army Corps of Engineers (USACE); organization of inter-agency meetings and service as a consistent leader and facilitator of ongoing communication between various interests within NOAA Physical Sciences Division (PSD) and multiple key partner groups at USBR, USACE, the National Weather Service (NWS) and other relevant regional stakeholders.
- Develop proposals for high-priority research projects; lead and organize cross-organizational teams on proposed projects; manage interdisciplinary project teams.

Previous Employment:

Research Scientist II — October 2011 – November 2015
(40 hours/week)

Cooperative Institute for Research in Environmental Sciences (CIRES)

- Serve as CIRES Lead for Hydrometeorological Modeling and Analysis Team (manage team of 10+ scientists)
- Design and lead independent and interdisciplinary team-directed research in NOAA ESRL's Physical Science Division related to extreme precipitation and flooding across

broad range of time and space (synoptic- and mesoscale) scales using high-resolution numerical models, and various observational and model-based datasets;

- Serve as Lead Scientist for NOAA Hydrometeorology Testbed: Southeast (HMT-SEPS), coordinating field studies and research studies to advance the understanding and improve forecasts of extreme precipitation toward acceleration of the development of related decision support tools;
- Lead studies of extreme precipitation in future climates in the complex terrain of mountainous regions by downscaling large-scale climate models to basin-scale or higher resolutions; relate results to climate model physical parameterization scheme areas of potential improvement and to the needs of operations/applications-based partners;
- Conduct case studies of extreme precipitation events to diagnose key physical processes and the potential for improved predictive understanding of extreme weather events including cool season, warm season, and tropical phenomena in the southeast US;
- Lead teams of CIRES and ESRL scientists toward synthesis of research into meaningful local, regional, national and international refereed scientific publications, presentations, and stakeholder-valued operations and applications;
- Serve as a liaison between CIRES/NOAA and the U.S. Bureau of Reclamation (USBR) and the U.S. Army Corps of Engineers (USACE); organization of inter-agency meetings and service as a consistent leader and facilitator of ongoing communication between various interests within NOAA Physical Sciences Division (PSD) and multiple key partner groups at USBR, USACE, the National Weather Service (NWS) and other relevant regional stakeholders.
- Develop proposals for high-priority research projects; lead and organize cross-organizational teams on proposed projects; manage interdisciplinary project teams.

Postdoctoral fellow — September 2009 – September 2011
(40 hours/week)

Postdocs Applying Climate Expertise (PACE) Program
Formerly: Climate Prediction Applications Postdoctoral Program (CPAPP)
Through the University Corporation for Atmospheric Research (UCAR) Visiting Scientist Program

- Assessed extreme precipitation events in future climates in collaboration with scientists from NOAA Earth System Research Laboratory, Western Water Assessment, and the US Bureau of Reclamation;
- Transition, communication, and application of research findings to water resources management challenges in the western US, particularly in areas of dam safety, vulnerability, risk, and adaptation strategy;
- Communicate meteorological expertise and provide expert advice on the appropriate use of various numerical techniques and datasets in stakeholder community operations and applications;
- Perform meteorological and climate analyses and diagnostic studies using large integrated climate and weather model data sets.

Citizenship: United States Citizen

2. EDUCATION

Ph.D., Atmospheric Science, North Carolina State University, December 2009
Dissertation title: *Momentum transport in mesoscale convective systems*

M.S., Atmospheric Science, North Carolina State University, August 2005
Thesis title: *The effect of upstream convection on downstream precipitation*

B.S., Meteorology, North Carolina State University, May 2003
Summa Cum Laude
Minor: Spanish
Concentration in Communication

Additional Coursework/Training:

- Colorado Leadership Development Program – Class of 2019
- The Science and Practice of Operational Ensemble Hydrological Prediction (NCAR, 2019)
- Climate and Weather Extremes Tutorial (NCAR, 2018)
- Model Evaluation Tools Tutorial (NCAR, 2018)
- Regional Climate Modeling Tutorial (NCAR, 2017)
- The Community WRF-Hydro Modeling System Training (NCAR, 2017)
- NCL (NCAR Command Language) Tutorial (NCAR, 2010)
- AMS Summer Policy Colloquium – Class of 2011
- WAS*IS (Weather and Society – Integrated Studies) – Class of 2008

3. REFEREED PUBLICATIONS

1. **Mahoney, K. M**., J. Scott, M. Alexander, R. McCrary, M. Hughes, D. Swales, M. Bukovsky: Current and Future Precipitation Projections for the Western United States in NA-CORDEX models, *Climate Dynamics, submitted*.

2. McCormick, W., J. Lukas, and **K. Mahoney**, 2020: 21st Century Dam Safety Rules for Extreme Precipitation in a Changing Climate, Journal of Dam Safety, **17**, 29 – 42.

3. **Mahoney, K. M.,** 2020: Extreme Hail Storms and Climate Change: Foretelling the future in tiny, turbulent crystal balls?", *Bull Amer Soc., January 2020, Vol. 101, No.1*.

4. Rutz, and **co-authors**, The Atmospheric River Tracking Method Intercomparison Project (ARTMIP): Quantifying Uncertainties in Atmospheric River Climatology*, Journal of Geophysical Research, Atmospheres.*

5. Bytheway, J. L., M. Hughes, **K. Mahoney**, R. Cifelli, 2020: On the uncertainty of high resolution hourly Quantitative Precipitation Estimates in California, *JHM*.

6. Viterbo, F., **K. Mahoney**, L. Read, F. Salas, B. Bates, J. Elliott, B. Cosgrove, A. Dugger, D. Gochis, R. Cifelli: A Cross-Scale, Hydro-Meteorological Forecast Evaluation of National Water Model Forecasts of the May 2018 Ellicott City, MD Flood. *J. Hydromet.*

7. Bytheway, J., Hughes, M., **Mahoney, K.**, Cifelli, R, 2019: A Multiscale Evaluation of Multisensor Quantitative Precipitation Estimates in the Russian River Basin. *J. Hydromet*., **20**, 447 – 466.

8. **Mahoney, K. M.**, D. Swales, M. Mueller, M. Alexander, K. Malloy, M. Hughes, 2018: An examination of an inland-penetrating atmospheric river flood event under potential future thermodynamic conditions. *J. Climate*, **31**, 6281–6297, https://doi.org/10.1175/JCLI-D-18-0118.1 ***(selected as "Paper of Note" by Bull. American Meteorological Society Sept. 2018)***

9. Shields, C. A., and **Coauthors** 2018: Atmospheric River Tracking Method Intercomparison Project (ARTMIP): project goals and experimental design, *Geosci. Model Dev.*, **11**, 2455-2474, https://doi.org/10.5194/gmd-11-2455-2018

10. Dole, R.M. and **Coauthors**, 2017: Advancing Science and Services during the 2015-16 El Niño: The NOAA El Niño Rapid Response Field Campaign: *Bull. Amer. Met. Soc., 10.1175/BAMS-D-16-0219.1*

11. Mueller, M., **K. M. Mahoney**, M. R. Hughes, 2017: High-resolution model-based investigation of moisture transport into the Pacific Northwest during a strong atmospheric river event. *Mon. Wea. Rev.,* **145***,* 3861 – 3870.

12. Moore, B. J., and **Mahoney, K. M.**, 2020: Atmospheric rivers in the southeastern United States," *Atmospheric Rivers: Two Decades of Process and Progress*, .

13. **Mahoney, K. M.**, 2016: The representation of cumulus convection in high-resolution simulations of the 2013 Colorado Front Range Flood. *Mon. Wea. Rev.,* **144**, 4265–4278.

14. **Mahoney, K. M.,** D. Jackson, P. Neiman, M. Hughes, L. Darby, G. Wick, A. White, E. Sukovich, R. Cifelli, 2016: Understanding the role of atmospheric rivers in heavy precipitation in the southeastern United States. *Mon. Wea. Rev.,* **144**, 1617 – 1632.

15. **Mahoney, K. M.**, F. M. Ralph, K. Wolter, N. Doesken, M. Dettinger, D. Gottas, T. Coleman, A. White, 2015: Climatology of extreme daily precipitation in Colorado and its diverse spatial and seasonal variability. *J. Hydrometeor.,* **16**, 781–792.

16. Barthold, F. E., T. E. Workoff, B. A. Cosgrove, J. J. Gourley, D. R. Novak, **K. M. Mahoney**, 2015: Improving Flash Flood Forecasts: The HMT-WPC Flash Flood and Intense Rainfall Experiment. *Bull. Amer. Met. Soc.,* **96**, 1859 – 1866. http://dx.doi.org/10.1175/BAMS-D-14-00201.1

17. White, A. B., **K. M. Mahoney**, R. Cifelli, and C. King, 2015: Wind Profilers to Aid with Monitoring and Forecasting of High Impact Weather in the Southeast U.S. *Bull. Amer. Met. Soc.,* Dec. 2015, 2039 – 2043.

18. Gochis, D. J., …, **K. M. Mahoney**, and co-authors, 2014: The Great Colorado Flood of September 2013. *Bull. Amer. Met. Soc., in press.* http://dx.doi.org/10.1175/BAMS-D-13-00241.1

19. Alexander, M. A., J. D. Scott, D. Swales, M. Hughes, **K. Mahoney**, C. A. Smith, 2015: Moisture Pathways into the US Intermountain West Associated with Heavy Winter Precipitation Events. *J. Hydrometeor, in press.* http://dx.doi.org/10.1175/JHM-D-14-0139.1

20. Moore, B. J., **K. Mahoney**, E. Sukovich, R. Cifelli, and T. Hamill, 2015: Climatology and environmental characteristics of extreme precipitation events in the Southeastern United States. *Mon. Wea. Rev.*, **143**, 718–741.

21. Baxter, M. A., G. M. Lackmann, **K. M. Mahoney**, T. E. Workoff, T. M. Hamill, 2014: Verification of quantitative precipitation reforecasts over the Southeast United States, *Wea. Forecasting*, in press. doi: http://dx.doi.org/10.1175/WAF-D-14-00055.1

22. M. Hughes, **K. M. Mahoney**, P. J. Neiman, B. J. Moore, M. Alexander, F. M. Ralph, 2014: The landfall and inland penetration of a flood-producing atmospheric river in Arizona. Part II: Sensitivity of modeled precipitation to terrain height and atmospheric river orientation. *J. Hydrometeor, **15***, 1954 – 1974.

23. Ralph. M.R., …, **K. M. Mahoney**, and co-authors, 2014: A Vision for Future Observations for Western U.S. Extreme Precipitation and Flooding. *Univ. Council on Water Resources*, **153,** 16 – 32.

24. **Mahoney, K.M.,** M. Alexander**,** J. D. Scott**,** and J. Barsugli, 2013: High-resolution downscaled simulations of warm-season extreme precipitation events in the Colorado Front Range under past and future climates. *J. Climate*, **26**, 8671 – 8689. doi: http://dx.doi.org/10.1175/JCLI-D-12-00744.1

25. Alexander, M., J. D. Scott, **K. M. Mahoney**, J. Barsugli, 2013: Greenhouse gas induced changes in summer precipitation over Colorado in NARCCAP regional climate models. *J. Climate*, **26**, 8690 – 8697. doi: http://dx.doi.org/10.1175/JCLI-D-13-00088.1

26. Neiman, P.J., F. M. Ralph, B. J. Moore, M. Hughes, **K. M. Mahoney**, J. M. Cordeira, M. D. Dettinger, 2013: The landfall and inland penetration of a flood-producing atmospheric river in Arizona. Part 1: Observed synoptic-Scale, orographic, and hydrometeorological characteristics. *J. Hydrometeor.,* **14**, 460-484.

27. **Mahoney, K. M.**, M. A. Alexander, G. Thompson, J. Barsugli, and J. Scott, 2012: Changes in hail and flood risk in high-resolution simulations over the Colorado Mountains. *Nature Clim. Ch.*, DOI: doi:10.1038/nclimate1344.

28. McNeeley, S.M., and **Coauthors**, 2012: Catalyzing frontiers in water-climate-society research: A view from early career scientists and junior faculty. *Bull. Amer. Meteor. Soc*., **93**, 477–484.

29. **Mahoney, K. M.**, and G. M. Lackmann, 2011: The sensitivity of momentum transport and severe surface winds to environmental moisture in idealized simulations of a mesoscale convective system. *Mon. Wea. Rev.*, **139,** 1352 - 1369.

30. **Mahoney, K. M.**, G. M. Lackmann, and M. D. Parker, 2009: The role of momentum transport in the motion of a quasi-idealized mesoscale convective system. *Mon. Wea. Rev.*, **137**, 3316 – 3338.

31. Brennan, M. J., G. M. Lackmann, and **K. M. Mahoney**, 2008: Potential vorticity (PV) thinking in operations: Diagnosing the dynamical impact of latent heat release in numerical model output. *Wea. Forecasting*, **23**, 168 – 182.

32. **Mahoney, K. M.**, and G. M. Lackmann, 2007: The effects of upstream convection on downstream precipitation. *Wea. Forecasting*, **22**, 255–277.

33. **Mahoney, K. M.**, and G. M. Lackmann, 2006. The sensitivity of coastal cyclogenesis forecasts to convective parameterization: A case study of the 17 February 2004 East coast cyclone. *Wea. Forecasting,* **21**, 465-488.

4. FUNDED PROPOSALS

2017 – 2019 Assessing potential future changes in atmospheric rivers over the western coast of the U.S. (Funded by US Bureau of Reclamation.) $203,702, Principal Investigator.

2016 – 2018 PSD and Probable Maximum Precipitation (PMP) Science: Exploring extreme precipitation processes and datasets to better inform stakeholder decisions. $256,798, Principal Investigator.

2015 – 2017 Demonstration of Advanced Ensemble Prediction Services for NWS Hydrometeorological Forecast Operations. NOAA Office of Weather and Air Quality Program Element Hydrometeorology Testbed Competition. $139,799. Principal Investigator.

2014 – 2016 Improving extreme precipitation estimation using regional, high-resolution model-based methods. Cooperative Institute for Research in Environmental Sciences (CIRES)/US Bureau of Reclamation. $256,500. Project Lead.

2014 – 2016 Diagnosing the moisture sources for extreme precipitation events in the western US: Application to hydrologic hazard analyses. Cooperative Institute for Research in Environmental Sciences (CIRES)/US Bureau of Reclamation. $221,672. Project Lead.

2014 – 2015 Extreme precipitation and flooding from atmospheric rivers: Understanding ARs. (A portion of the Hurricane Sandy Supplemental Package) $301,616. Principal Investigator.

2011 – 2013 Improving extreme precipitation estimation and climate change projections using regional and high-resolution model simulations. Cooperative Institute for Research in Environmental Sciences (CIRES)/US Bureau of Reclamation. $200,000. Project Lead.

2011 – 2013 Diagnosing the moisture sources for extreme precipitation events in the intermountain west. Cooperative Institute for Research in Environmental Sciences (CIRES)/US Bureau of Reclamation. $250,000. Project Lead.

5. OTHER PUBLICATIONS

Theses and Dissertations:

Mahoney, K. M., 2009: Momentum transport in mesoscale convective systems. PhD dissertation, Dept. of Marine, Earth, and Atmospheric Sciences, North Carolina State University, 280pp.

Mahoney, K. M., 2005: The effect of upstream convection on downstream precipitation. M.S. thesis, Dept. of Marine, Earth, and Atmospheric Sciences, North Carolina State University, 204pp.

Technical reports:

1. **Mahoney, K.**, J. Lukas, and M. Mueller, 2018: Considering Climate Change in the Estimation of Extreme Precipitation for Dam Safety. Colorado – New Mexico Regional Extreme Precipitation Study Summary Report, Volume VI. 65pp. http://water.state.co.us/SurfaceWater/DamSafety/Pages/DamSafety.aspx

2. **Mahoney, K. M.**, E. James, T. Alcott, R. Cifelli, 2018: Application of Dynamical Model Approaches Using the NOAA High Resolution Rapid Refresh (HRRR) and Weather Research and Forecast (WRF) Models. Volume IV. Colorado – New Mexico Regional Extreme Precipitation Study Summary Report, Volume IV. http://water.state.co.us/SurfaceWater/DamSafety/Pages/DamSafety.aspx

3. Lukas, J., K. Wolter, **K. Mahoney**, J. Barsugli, N. Doesken, W. Ryan, I. Rangwala, B. Livneh, E. Gordon, M. Hoerling and G. Kiladis, 2013: Severe flooding on the Colorado Front Range, September 2013: A preliminary assessment. (http://wwa.colorado.edu/resources/front-range-floods/assessment.pdf)

4. Sankovich, V., J. Caldwell, **K. Mahoney**, 2012: Green Mountain Dam Climate Change: Dam Safety Technology Development Program, Report DSO-12-03.

5. Cifelli, R., **K. Mahoney**, and co-authors, 2012: NOAA HMT-SE Science Plan: 2013-2014 Pilot Study. http://hmt.noaa.gov/field_programs/hmtse/

Conference Publications:

1. Lackmann, G.M., and **K.M. Mahoney**, and M. D. Parker, 2011: Parameterized convective momentum adjustment. *Extended abstracts, 24th Conference on Weather Analysis and Forecasting/20th Conference on Numerical Weather Prediction,* 27 January 2011, Seattle, WA.

2. **Mahoney, K. M.** and G. M. Lackmann, 2009: MCS motion: The role of vertical momentum transport. *Extended abstracts, 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction,* 3 June 2009, Omaha, NE. Available online at http://ams.confex.com/ams/pdfpapers/154188.pdf

3. **Mahoney, K. M.** and G. M. Lackmann, 2009: The role of the trailing stratiform region in convective momentum transport and mesoscale convective system motion. *Extended abstracts, 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction,* 3 June 2009, Omaha, NE. Available online at http://ams.confex.com/ams/pdfpapers/154189.pdf.

4. **Mahoney, K. M.** and G. M. Lackmann, 2007: The sensitivity of squall line motion to environmental changes in 3D idealized WRF forecasts. *Extended abstracts, 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction,* 27 June 2007, Park City, UT. Available online at http://ams.confex.com/ams/pdfpapers/124309.pdf.

5. Cassell, C. M., G. M. Lackmann, and **K. M. Mahoney**, 2007: Improving anticipation of the influence of upstream convection on QPF. *Extended abstracts, 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction,* 27 June 2007, Park City, UT.

6. **Mahoney, K. M.**, and G. M. Lackmann, 2005: The effects of organized upstream convection on downstream precipitation: Physical processes and model representation. *Extended abstracts, 11th Conference on Mesoscale Processes/32nd Conference on Radar Meteorology,* Albuquerque, NM, Amer. Meteor. Soc. Available online at http://ams.confex.com/ams/pdfpapers/96293.pdf.

7. **Mahoney, K. M.**, and G. M. Lackmann, 2005: The influence of convective parameterization on model forecasts of an East Coast cyclone. *Extended abstracts, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction*, Washington, DC, Amer. Meteor. Soc. Available online at http://ams.confex.com/ams/pdfpapers/94480.pdf.

8. **Mahoney, K. M.**, and G. M. Lackmann, 2005: The effects of organized upstream convection on downstream precipitation. *Extended abstracts, 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction*, Washington, DC, Amer. Meteor. Soc. Available online at http://ams.confex.com/ams/pdfpapers/94481.pdf.

9. Brennan, M. J., G. M. Lackmann, and **K. M. Mahoney**, 2005: Potential vorticity as a tool for assessing dynamical impacts of latent heat release in model forecasts. *Extended abstracts*, *21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction,* Washington, DC, Amer. Meteor. Soc. Available online at http://ams.confex.com/ams/pdfpapers/94477.pdf

Invited contributions:

Mahoney, K. M. Extreme Precipitation Events in Future Climates: Weather, Water and Climate Research Applications for the Colorado Front Range. National Weather Association Newsletter, No. 11 -6, June 2011: https://member.nwas.org/system/files/nwa_pubs/NWA-Newseltter-June-2011-portal.pdf

Mahoney, K. M. Future Flash Floods in the Front Range: The Value of Field Time to Facilitate Applied Research, NCAR Fellows Newsletter, October 2011: http://www.asp.ucar.edu/asp_update/10/October-Newsletter.pdf

6. CONFERENCE PRESENTATIONS

1. Extremes: Where the Rubber Meets the Road, Climate Workshop panelist/presenter. Invited speaker, Colorado Water Congress Annual Convention. 29 Jan 2020, Westminster, CO.

2. Projections in Many Directions: Extracting Meaningful Guidance for Water Resources Planning in the Western United States from the NA-CORDEX GCM-RCM Ensemble, 33rd Conference on Climate Variability and Change, 13 January 2020, Boston, MA.

3. Integrated hydrometeorological assessments to deepen forecast error insight: A case study of the 27 May 2018 Ellicott City flood. Workshop on the Hydrometeorological Testbed and Extreme Precipitation Forecasting Improvement, 15 Oct 2019, College Park, MD.

4. What can dynamical weather modeling offer 21st Century PMP? Invited talk, Association of State Dam Safety Officials Dam Safety 2019 Conference, 11 Sept 2019, Orlando, FL.

5. Potential Uses of the Weather Research and Forecast (WRF) Model in PMP and PF Estimation. Invited talk, Association of State Dam Safety Officials Dam Safety 2019 West Regional Conference, 26 March 2019, Westminster, CO.

6. Climate Science/Subject matter expert panelist/presenter. Invited talk, Colorado Water Congress Annual Convention. 30 Jan 2019, Westminster, CO

7. Understanding the Role of Forecast Forcings in National Water Model Errors. 29th Conference on Weather Analysis and Forecasting, 8 June 2018, Denver, CO.

8. New Data for Old Storms: Can New, Convection-Allowing Ensemble Simulations of Historic Storms Help Minimize Present-Day Flood Risk? 29th Conference on Weather Analysis and Forecasting, 5 June 2018, Denver, CO.

9. Everyone at the Table: Colorado and New Mexico's Comprehensive Approach to Modernizing Extreme Precipitation Estimation for Dam Safety Decision-Making. Amer. Meteor. Soc. 32nd Conf. on Hydrology, 11 January 2018, Austin, TX.

10. An Examination of an Inland-Penetrating Atmospheric River Flood Event under Potential Future Thermodynamic Conditions. 31st Conference on Climate Variability and Change, 10 January 2018, Austin, TX.

11. NOAA Testbed Demonstration of a Time-Lagged National Water Model Ensemble Prototype for Flash Flood Forecasting. Amer. Meteor. Soc. Eighth Conf. on Transition of Research to Operations, 13 January 2018, Austin, TX.

12. An "Ensemble Approach" to Modernizing Extreme Precipitation Estimation for Dam Safety Decision-Making. 2017 American Geophysical Union (AGU) Fall Meeting, 9 December 2017, New Orleans, LA.

13. Demonstration of a HRRR-National Water Model Hydrometeorological Ensemble Prototype for Flash Flood Forecasting. Amer. Meteor. Soc. Seventh Conf. on Transition of Research to Operations, 24 January 2017, Seattle, WA.

14. Examining terrain elevation assumptions used in current extreme precipitation estimation practices: A modeling study of the 2013 Colorado Front Range floods. Amer. Meteor. Soc. 30th Conf. on Hydrology, January 2016, New Orleans, LA.

15. Exploring probabilistic precipitation and hydrologic forecasts for a flash flood event. 27th Conference on Weather Analysis and Forecasting/23rd Conference on Numerical Weather Prediction, 30 June 2015, Chicago, Ill.

16. Atmospheric rivers and the connection to heavy rainfall events in the southeastern U.S. compared to the U.S. West Coast. 27th Conference on Weather Analysis and Forecasting/23rd Conference on Numerical Weather Prediction, 30 June 2015, Chicago, Ill.

17. Atmospheric rivers and the connection to heavy rainfall events in the southeastern U.S. American Geophysical Meeting, December, 2014, San Francisco, CA.

18. The sensitivity of a coupled hydrometeorological flash flood forecast to model physics and initial state perturbations: A WRF-Hydro demonstration. 15th Annual WRF Users' Workshop, 26 June 2014, Boulder, CO.

19. Coupling atmospheric and hydrological modeling toward flash flood forecast improvement: An HMT-Southeast case study from the 2013 Flash Flood and Intense Rainfall Forecast Experiment. 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction, 6 February 2014, Atlanta, GA.

20. The impact of model physics and upstream moisture sources on the May 2010 Tennessee flooding event: An examination of precipitation and surface hydrology. 14th Annual WRF Users' Workshop, 26 June 2013, Boulder, CO. (Presentation link)

21. A high-resolution, event-based modeling framework for understanding the impact of climate change on hydrometeorological extreme events. 27th AMS Conference on Hydrology/25th AMS Conference on Climate Variability and Change, 10 January 2013.

22. Understanding forecast errors in extreme precipitation events in the Southeast U.S. 3rd AMS Conference on Transition of Research to Operations, 10 January 2013.

23. Extreme precipitation events in the Southeast US: A preliminary investigation of operational forecast challenges related to moisture sources and transport. 25th Conference on Weather Analysis and Forecasting/21st Conference on Numerical Weather Prediction/46th Congress of the Canadian Meteorological Society, 29 May 2012, Montreal, Canada.

24. High-resolution dynamical downscaling of extreme precipitation in three future climate regimes. 25th Conference on Weather Analysis and Forecasting/21st Conference on Numerical Weather Prediction/46th Congress of the Canadian Meteorological Society, 30 May 2012, Montreal, Canada.

25. From regional-scale to storm-scale: NARCCAP-driven high-resolution simulations to evaluate changes in extreme precipitation events *(Invited)*. 2011 American Geophysical Union (AGU) Fall Meeting, 6 December 2011, San Francisco, CA.

26. High-resolution modeling approaches to understanding changes in extreme precipitation projections. 2011 American Geophysical Union (AGU) Fall Meeting, 9 December 2011, San Francisco, CA.

27. A comparison of three high-resolution dynamical downscaling methods to examine extreme precipitation in future climate regimes. 24th AMS Conference on Weather Analysis and Forecasting/20th Conference on Numerical Weather Prediction, 26 January 2011, Seattle, WA.

28. Assessing the potential for changes in extreme precipitation events across the Colorado Front Range. 25th Conference on Hydrology, 24 January 2011, Seattle, WA.

29. Understanding potential changes in extreme precipitation events across the Colorado Front Range: A WRF-based modeling study. 2010 American Geophysical Union (AGU) Fall Meeting, 13 December 2010, San Francisco, CA.

30. Extreme precipitation events in future climates: Water-based research applications in the Colorado Front Range. National Weather Association 2010 Annual Meeting, 7 October 2010, Tucson, AZ.

31. Extreme precipitation events across the Colorado Front Range in future climates. 14th AMS Conference on Mountain Meteorology, 1 September 2010, Lake Tahoe, CA. (Recorded presentation available online: http://ams.confex.com/ams/14MountMet/techprogram/session_24135.htm)

32. Extreme precipitation events across the Colorado Front Range in Future Climates. 2010 Boulder Laboratories Postdoctoral Poster Symposium, 30 June 2010, Boulder, CO.

33. MCS motion: The role of vertical momentum transport. 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 3 June 2009, Omaha, NE.

34. The role of the trailing stratiform region in convective momentum transport and mesoscale convective system motion. 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction, 3 June 2009, Omaha, NE.

35. The sensitivity of squall line motion to environmental changes in 3D idealized WRF forecasts. 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction, 27 June 2007, Park City, UT.

36. The effects of organized upstream convection on downstream precipitation: Physical processes and model representation. 11th Conference on Mesoscale Processes/32nd Conference on Radar Meteorology, 25 October 2005, Albuquerque, NM.

37. The influence of convective parameterization on model forecasts of an East Coast cyclone. 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, 5 August 2005, Washington, DC. (Recorded presentation available online: http://ams.confex.com/ams/WAFNWP34BC/wrfredirect.cgi?id=4062)

38. The effects of organized upstream convection on downstream precipitation. 21st Conference on Weather Analysis and Forecasting/17th Conference on Numerical Weather Prediction, 1 August 2005, Washington, DC. (Recorded presentation available online: http://ams.confex.com/ams/WAFNWP34BC/wrfredirect.cgi?id=3916)

39. Flash flood forecasting: Numerical simulations of a local case study. 3rd Annual Student Conference, 11 January 2004, Seattle, Washington.

7. OTHER PRESENTATIONS (Note: not updated since 2017)

- Demonstration of time-lagged HRRR-National Water Model ensemble prototype for flash flood forecasting. Weather Prediction Center/NOAA Hydrometeorology Testbed Flash Flood and Intense Rainfall Experiment (FFaIR), College Park, MD, 28 June 2017.

- Demonstration of a HRRR-National Water Model hydrometeorological ensemble prototype for flash flood forecasting. Weather Prediction Center/NOAA Hydrometeorology Testbed Flash Flood and Intense Rainfall Experiment (FFaIR), College Park, MD, 22 June 2016.

- Demonstration of Advanced Ensemble Prediction Services for NWS Hydrometeorological Forecast Operations. 7th NOAA Testbed and Proving Ground Workshop, 5 April 2016.

- New understanding of hydroclimatic extremes in the West: Implications for hazard planning and management. Invited, 40th Annual Natural Hazards Research and Applications Workshop, 20 July 2015.

- Using WRF-Hydro to exploring probabilistic precipitation and hydrologic forecasts for a flash flood event. NCEP Weather Prediction Center Flash Flood and Intense Rainfall Forecast Experiment, 14 July 2015.

- Exploring probabilistic precipitation and hydrologic forecasts for a flash flood event. National Weather Service Western Region SOO/DOH webinar series, 17 June 2015.

- Evaluating the utility of atmospheric river detection in forecasting heavy rainfall events in the southeastern U.S. 6th NOAA Testbed and Proving Ground Workshop, 15 April 2015.

- Making Climate Change Local: High-resolution downscaling of extreme precipitation projections in the Colorado Front Range. Invited talk, Studies of Precipitation, flooding, and Rainfall Extremes Across Disciplines (SPREAD) Workshop. 20 June 2013, Ft. Collins, CO.

- Extreme precipitation in the Southeast US: HMT-Southeast's specialized observations and modeling focus on high-impact forecast challenges. 4th NOAA Testbed and Proving Ground Workshop, 3 April 2013.

- High-Resolution Numerical Modeling as a Tool to Assess Extreme Precipitation Events. Invited talk, United States Nuclear Regulatory Commission Workshop on Probabilistic Flood Hazard Assessment. 29 – 31 January 2013, Rockville, MD.

- NOAA Hydrometeorology Testbed: New efforts in the Southeast US. 5th International Workshop for Global Precipitation Measurement Ground Validation, 11 July 2012, Toronto, Canada.

- Improving prediction of extreme precipitation events in the Southeast US: Moisture sources and transport mechanisms. 3rd NOAA Testbed and Proving Ground Workshop. 2 May 2012, Boulder, CO.

- High-resolution modeling approaches to understanding changes in extreme precipitation projections (Poster). 2012 CIRES Rendezvous, 24 April 2012, Boulder, CO.

- High-resolution downscaling approaches to understanding changes in extreme precipitation in NARCCAP regional climate projections. Invited talk, 2012 NARCCAP Users' Workshop. 10 – 11 April 2012, Boulder, CO.

- Making Climate Change Local: High-resolution downscaling of extreme precipitation projections in the Colorado Front Range. Invited seminar, Center for Science and Technology Policy Research at CU-Boulder Spring 2012 Noontime Seminar Series. 2 April 2012, Boulder, CO.

- High-resolution modeling approaches to understanding changes in extreme precipitation projections. Invited talk, NOAA NWS Office of Hydrologic Development/NOAA ONE Seminar Series. 10 November 2011, Silver Spring, MD.

- Extreme precipitation events in future climates across the Colorado Front Range. US Bureau of Reclamation, 1 June 2010, Lakewood, Colorado.

- Momentum transport in mesoscale convective systems: Model representation and forecast implications. NOAA Earth System Research Laboratory Physical Sciences Division 2/Water Cycle Branch Seminar, 4 February 2010, Boulder, Colorado.

- Momentum transport in mesoscale convective systems. NOAA Earth System Research Laboratory Physical Sciences Division Seminar, 28 October 2009, Boulder, Colorado.

- Visualizations of a high-resolution simulated squall-line. NC State University Graduate School Advisory Board Annual meeting, 07 November 2008, Raleigh, North Carolina.

- Pseudo-idealized WRF modeling studies, convective momentum transport, and MCS motion. Invited talk (with Gary Lackmann), Storm Prediction Center Spring Experiment. 29 May 2007, Norman, Oklahoma.

- The effect of organized upstream convection on downstream precipitation. Transforming Higher Education: Building a Women's Agenda, NC State University. 2 February 2007, Raleigh, North Carolina.

- CSTAR Presentation, The influence of convective parameterization on model forecasts of an East Coast cyclone. 6 October 2005, Raleigh, North Carolina.

- CSTAR Presentation, The effects of upstream convection on downstream precipitation. 6 October 2005, Raleigh, North Carolina.

- The effects of upstream convection on downstream precipitation. Invited talk, Hydrometeorological Prediction Center. 3 August 2005, Camp Springs, Maryland.

- Flash flood forecasting: Numerical simulations of a local case study. Undergraduate Research Symposium, NC State University. April 2003, Raleigh, North Carolina.

8. TECHNICAL SKILLS

- Case study and real-time modeling with WRF, WRF-Hydro, MM5, Workstation Eta
- Analysis of observations and numerical datasets to diagnose physical processes
- NCL
- FORTRAN
- GEMPAK, IDV
- Unix/shell scripting
- Visualization with Adobe Photoshop and Illustrator

9. FACULTY, TEACHING, AND MENTORING EXPERIENCE

(Teaching portfolio available upon request)

- Adjunct Assistant Professor, 2014 – present
    - North Carolina State University
    - Graduate committee member for Jennifer Tate, M.S. candidate

- Guest lecturer, Spring 2015
    - University of Colorado at Boulder/Coursera on-line course
    - Water in the Western United States: Lecture 5/Module 2: River and Flash Flooding

- Participation in North Carolina State University Preparing the Professoriate Program, 2006 – 2007
    - Completed seminar series, observation semester, and teaching semester
    - Selected for funding award

- Assistant instructor
    - Weather Forecasting and Analysis, Fall 2007

- Guest Lecturer
  - Weather Forecasting and Analysis, Fall 2008
  - Fundamentals of Meteorology II, Spring 2007, Spring 2009
  - Applied Numerical Weather Prediction, Spring 2006

10. COLLABORATION AND PROFESSIONAL OUTREACH ACTIVITIES

- Presented to, joined CO Climate Science Adaptation, Front Range Climate Change workgroup, April 2020: Colorado Dam Safety 21st Century Climate Adaptation Tools
- Colorado Congressional Roundtable: Water Management Science and Service panel. Boulder CO, 31 May 2017.
- Interviewee/subject matter expert, "Chasing El Nino" video for The Learning Design Group, Lawrence Hall of Science, UC Berkeley/Amplify Science Middle School nationwide science curriculum. Released December 2016.
- Invited speaker, U.S. Representative Jared Polis's Women in Innovation Summit: Women in Science and Engineering Panel, 28 March 2016, Boulder, CP
- Member, Task Committee on "Use of Physics-based Atmospheric Numerical Models for Estimating Probable Maximum Precipitation": Environmental & Water Resources Institute/American Society of Civil Engineers, October 2014 – present
- Boulder Valley School District NOAA Science Days Presenter: 2013 Front Range Flood: Was it a 100-year Storm? 14 February 2014
- Consultant (unpaid) for US Army Corps of Engineering, 2013: Mississippi River 2011 Post Flood Assessment: Task 1 – Adequacy of MR&T Project Design Flood Climate Change Impacts on Dew Point Calculation for Maximized 2011 Event to Project Design Storm
- Invited panelist, Severe Flooding on the Colorado Front Range: Flood Expert Panel and Community and Media Outreach, 25 September 2013
- Participant, National Weather Service Weather Prediction Flash Flood and Intense Rainfall Forecasting experiment: 15 – 19 July 2013
- Participant, American Meteorological Society Summer Policy Colloquium, 5 – 14 June 2011
- Participant and presenter at Weather and Society*Integrated Studies (WAS*IS) Summer 2008 workshop (Presentations: "Vulnerability and resilience of special populations in severe weather events" and "The impact of false alarms vs. missed forecasts")
- Participation in Storm Prediction Center Spring Experiment, May 2007 and May 2008, Norman, OK
- COMET collaborative grant with Raleigh National Weather Service office, 2006-2007
- Participation in the CSTAR program, 2003 – 2005
  - Multiple presentations to surrounding CSTAR offices
  - Assistance with associated VISIT teletraining sessions
- Participation in the National Weather Service - North Carolina State University internship course, 2004
- **Media outreach/communication** (ongoing; on topics including extreme precipitation, climate change, southeastern US special interests, etc.):
    - National Geographic; The Weather Channel; ClimateWire; Reuters; Colorado Public Radio; Boulder Daily Camera, Denver Post; North Carolina Associated Press; High Country News; many other local news outlets (radio, TV, and newspapers)

11. SERVICE AND PARTICIPATION IN PROFESSIONAL SOCIETIES

- Associate Editor, Weather and Forecasting (2018 – present)
- Member, AMS Forecast Improvement Group executive committee (2016 – present)
- Chair, NOAA Physical Sciences Division Workplace Advisory Committee (Feb 2019 – June 2020)
- President, Commerce Children's Center Association Board of Directors (Oct 2019 – present)
- Member, AMS Board on Higher Education (2014 – 2018)
- Member, Developmental Testbed Center Science Advisory Board, July 2014 – 2017
- Member, AMS Weather Analysis and Forecasting Committee, August 2009 – January 2016
- Member, ASCE/EWRI Task Committee on Use of Atmospheric Models to Estimate Probable Maximum Precipitation, 2014 - present
- Member, NWA Committee on Societal Impacts of Weather and Climate, June 2009 – 2017
- Associate Editor, Monthly Weather Review, October 2011 – 2013
- Co-chair of planning committee for 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction in Atlanta, GA, 2014
- Invited panelist, CIRES "Think Outside the Lab; Six Exciting Alternative Careers in Science." 6 March 2013, University of Colorado, Boulder, CO.
- Invited panelist, National Science Foundation Atmospheric and Geospace Sciences Post-Doctoral Fellowship Workshop Career Panel: "Post Post-Doc: What Are The Next Steps and Ways Forward?"
- Co-chair of planning committee for AMS Weather Analysis and Forecasting/Numerical Weather Prediction Symposium at 2013 AMS Annual Meeting in Austin, TX
- Member, AMS Committee on Improving Climate Change Communication, September 2010 – present
- Member, National Weather Association (NWA), 2009 – present
- Member, American Geophysical Union (AGU), 2010 – present
- Member, American Meteorological Society (AMS), 2000 – present
- Member, AMS Local Chapter: Denver-Boulder, CO, November 2009 – present
- Secretary, AMS Local Chapter: Denver-Boulder, CO, April 2010 – 2012
- Reviewer (no longer tracking/not up-to-date): *Journal of Hydrometeorology* (2013 – present), *Journal of Geophysical Research: Atmospheres* (2012), *Journal of Climate* (2010 - present), *Monthly Weather Review* (2009 - present), *Bulletin of the American Meteorological Society* (2008; 2010), *Journal of Applied Meteorology and Climatology* (2011), *Meteorology and Atmospheric Physics* (2011), *Atmospheric Research* (2010), *International Journal of Climatology* (2007)
- Member, Planning committee for AMS 24th Conference on Weather Analysis and Forecasting/20th Conference on Numerical Weather Prediction (Seattle, WA, Jan 2011)
- Committee Chair, AMS Francis W. Reichelderfer Award Committee (2010)
- Member, Planning committee for AMS 23rd Conference on Weather Analysis and Forecasting/19th Conference on Numerical Weather Prediction (Omaha, NE, June 2009)
- Student member, AMS Weather Analysis and Forecasting Committee, Feb 2008 – August 2009
- Member, AMS Student Chapter (NCSU), 1999 – 2009

- Vice-President, AMS Student Chapter (NCSU), 2002–2003
- Member, AMS Central North Carolina Chapter, 1999 – 2009
- Appointed member, NC State University Council on the Status of Women, 2005 – 2007
- Mentorship: NOAA Hollings Scholar (Kelsey Malloy, 2016), Departmental graduate student mentor program (2005 – 2007), and Independent Research Class mentor (for student at Mt. Hebron High School, Ellicott City, MD, August 2008 – May 2009)
- Volunteer, Girl Scouts at NCAR, May 1, 2010

12. AWARDS AND HONORS

- 2020 Bulletin of the American Meteorological Society Editor's Award "For insightful, thorough, and constructive reviews that contributed to improving impactful manuscripts."
- 2019 Governor's Award for High-Impact Research: Estimating Extreme Weather to Avoid Flood Risks
- 2018 NOAA ESRL Outreach Gold Star Award
- Paper of Note, Bulletin of the American Meteorological Society, September 2018
- "Top 5" R2O NOAA project elevated to Forecast Improvement Act congressional hearings
- Best Paper Award, Honorable Mention: 7th NOAA Testbed and Proving Ground Workshop, April 2016
- 2014 Nominee for Presidential Early Career Award for Scientists and Engineers (PECASE) – Physical Sciences Division, NOAA ESRL
- UCAR/PACE Postdoctoral Fellowship Award recipient: 2009 - 2011
- AMS 23WAF/19NWP Conference Student award – 1st Place Oral Presentation (June 2009)
- AMS National Graduate Fellowship Award (2003 – 2004)
- AMS 22WAF/18NWP Conference Student award – 1st Place Oral Presentation (June 2007)
- Park Scholarship Recipient (1999-2003)
- Phi Beta Kappa, Phi Kappa Phi, Golden Chain Honor Society, Sigma Delta Pi, National Spanish Honor Society
- Central North Carolina AMS Academic Achievement Award
- ENAC (Electronic News Association of the Carolinas) Student Weather Broadcast Award – First Place
- Outstanding Senior Award – Department of Marine, Earth, and Atmospheric Sciences (2003)
- Valedictorian (2003)

13. OTHER EXPERIENCE

Forecaster, Progress Energy Ventures, 2006 – 2007
Generated short, medium, and long-range regional and national forecasts for forecasts tailored to energy trading interests.

Participant, OU WxChallenge National Forecasting Contest, 2007 – 2009

Participant, National Collegiate Weather Forecasting Contest, 2001 – 2006

Graduate Research Assistant, NC State University, 08/03 – 09/09
Conducted research for Master's and Doctoral thesis projects

Weather Anchor and Reporter, *Carolina Week*, University of North Carolina at Chapel Hill,

2000 – 2004
Produced and delivered weekly weather segments
Filmed, wrote, and edited packages using linear and digital editors

Undergraduate Researcher, NC State University, 5/02 – 5/03
Performed a case study on a local flash flood
Ran the NCAR/PSU MM5 model to better simulate observed precipitation

Weathercenter Intern, WRAL-TV Raleigh, 5/02 – 12/02
Analyzed MM5 model output statistics for temperature biases
Responded to viewers' questions and comments

WKNC Radio, NC State University, 2000-2002
Prepared news and weather reports
Performed disc-jockey/on-air duties

Weathercenter Intern, WBAL-TV Baltimore, MD, 5/00-8/00
Responded to viewers' questions and comments