

CURRICULUM VITAE

Kelly M. Mahoney

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1. EMPLOYMENT

Research Scientist October 2011 – present
Cooperative Institute for Research in Environmental Sciences (CIRES)

Lead and perform research related to extreme precipitation across various time and space scales using high-resolution numerical models, and various observational and model-based datasets.

Previous Employment:

Postdoctoral fellow September 2009 – September 2011

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. Applied research findings to water resources management challenges in the western US, particularly in areas of dam safety, vulnerability, risk, and adaptation strategy.

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

Minor: Spanish

Concentration in Communication

3. REFEREED PUBLICATIONS

1. **Mahoney, K. M.**, M. A. Alexander, G. Thompson, J. Barsugli, and J. Scott: Changes in hail and flood risk in high-resolution simulations over the Colorado Mountains. *Nature Clim. Ch.*, *in review*.
2. McNeeley, S.M., and **Coauthors**, 2011: Catalyzing frontiers in water-climate-society research: A view from early career scientists and junior faculty. *Bull. Amer. Meteor. Soc.*, *in press*.

3. **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.
4. **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.
5. 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.
6. **Mahoney, K. M.**, and G. M. Lackmann, 2007: The effects of upstream convection on downstream precipitation. *Wea. Forecasting*, **22**, 255–277.
7. **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. 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.

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

5. CONFERENCE PRESENTATIONS

1. A comparison of three high-resolution dynamical downscaling methods to examine extreme precipitation in future climate regimes. 24th Conference on Weather Analysis and Forecasting/20th Conference on Numerical Weather Prediction, 26 January 2011, Seattle, WA.
2. Assessing the potential for changes in extreme precipitation events across the Colorado Front Range. 25th Conference on Hydrology, 24 January 2011, Seattle, WA.

3. 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.
4. 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.
5. Extreme precipitation events across the Colorado Front Range in future climates. 14th Conference on Mountain Meteorology, 1 September 2010, Lake Tahoe, CA. (Recorded presentation available online: http://ams.confex.com/ams/14MountMet/techprogram/session_24135.htm)
6. Extreme precipitation events across the Colorado Front Range in Future Climates. 2010 Boulder Laboratories Postdoctoral Poster Symposium, 30 June 2010, Boulder, CO.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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>)
12. 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>)
13. Flash flood forecasting: Numerical simulations of a local case study. 3rd Annual Student Conference, 11 January 2004, Seattle, Washington.

6. OTHER PRESENTATIONS

- 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.

7. TECHNICAL SKILLS

- Case study and real-time modeling with WRF, 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

8. TEACHING EXPERIENCE

(Teaching portfolio available upon request)

- Participation in 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

9. COLLABORATION AND OUTREACH ACTIVITIES

- 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

10. SERVICE AND PARTICIPATION IN PROFESSIONAL SOCIETIES

- Associate Editor, *Monthly Weather Review*, October 2011 - present
- Member, AMS Committee on Improving Climate Change Communication, September 2010 – present
- Member, AMS Weather Analysis and Forecasting Committee, August 2009 – present
- Member, NWA Committee on Societal Impacts of Weather and Climate, June 2009 – 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 – present
- Reviewer: *Journal of Climate* (2010), *Monthly Weather Review* (2009, 2011), *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
- Student representative, NCSU Educational and Technology Funds Appropriation Committee, Sept 2008 – Sept 2009
- Student representative, NCSU Faculty Search Committee, Oct 2007 – Mar 2008
- 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
- Department representative, NC State University Graduate Student Association, August 2005 – 2007
- Department representative, NC State Library System, August 2005 – 2009
- Mentor: 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
- Co-president, Hope for the Homeless, NCSU Chapter, 2000–2002
- Volunteer children's tutor, Salvation Army Raleigh, NC, 2000 – 2003

11. AWARDS AND HONORS

- 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)
- Phi Beta Kappa
- Phi Kappa Phi
- Golden Chain Honor Society
- Park Scholarship Recipient (1999-2003)
- 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)

12. 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