

Jason Clark Knievel

Curriculum Vitae
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National Center for Atmospheric Research
3450 Mitchell Lane
Boulder, CO, USA 80301
knievel@ucar.edu
303-497-8995 (voice) 303-497-8401 (facsimile)
Citizen of the United States of America

EDUCATION

2001 **Ph.D.** Department of Atmospheric Science, Colorado State University, Fort Collins, CO
1996 **M.S.** Department of Atmospheric Science, Colorado State University, Fort Collins, CO
1992 **B.S.** Department of Meteorology, The Pennsylvania State University, University Park, PA

CURRENT POSITIONS

11/08– **Department of Atmospheric and Oceanic Sciences, University of Colorado, Boulder, CO**
Research associate
Role: Service on graduate committees

11/09– **Research Applications Laboratory, National Center for Atmospheric Research, Boulder, CO**
Project scientist II
Roles: Applied research and technology-transfer in mesoscale meteorology, modification and application of the Weather Research and Forecasting (WRF) Model, project management
Projects: ATEC-4DWX¹ (co-manager and lead scientist), NGIC-GCAT² (seasonal climate forecaster)

PAST RESEARCH POSITIONS

04/06–11/09 **Research Applications Laboratory, NCAR³**
Project scientist I
03/04–03/06 *Associate scientist III*

06/02–03/04 **Mesoscale and Microscale Meteorology Division, NCAR**
Postdoctoral fellow

09/01–05/02 **National Severe Storms Laboratory, Boulder, CO**
NRC⁴ postdoctoral research associate

07/01–09/01 **Department of Atmospheric Science, CSU⁵**
Postdoctoral research associate
08/93–07/01 *Graduate research assistant*
04/93–08/93 *Staff research assistant*

PAST TEACHING POSITIONS

08/02–12/02 **Program in Atmospheric and Oceanic Sciences, CU⁶**
Co-instructor

08/97–12/97 **Department of Atmospheric Science, CSU**
Laboratory instructor
01/97–12/97 *Graduate teaching assistant*

Taught Earth-climate system (graduate), introduction to weather and climate laboratory (undergraduate)

Assisted Advanced synoptic and mesoscale weather laboratory (graduate)

OTHER PAST POSITIONS

Department of Meteorology, PSU⁷
 01/93–03/93 *Assistant technician*
 12/88–12/92 *Assistant caretaker of the University Weather Observatory*

Weather Communications Group, PSU
 05/91–12/92 *Weather forecaster and newspaper columnist*

Accu-Weather, Inc., State College, PA
 07/90–05/92 *Weather forecaster and radio broadcaster*

WWZW 95.3 FM, State College, PA
 05/89–05/90 *Weather forecaster and consultant*

PEER-REVIEWED SCIENTIFIC PAPERS

2010 Frehlich, R., R. Sharman, F. Vandenberghe, W. Yu, Y. Liu, J. C. Knievel, and G. Jumper, 2010: Estimates of C_n^2 from numerical weather prediction model output and comparison with thermosonde data. *J. Appl. Meteor. Climatol.*, **49**, 1742–1755. DOI: 10.1175/2010JAMC2350.1.

 Knievel, J. C., D. L. Rife, J. A. Grim, A. N. Hahmann, J. P. Hacker, M. Ge, and H. H. Fisher, 2010: A simple technique for creating regional composites of sea-surface temperature from MODIS for use in operational mesoscale NWP. *J. Appl. Meteor. Climatol.*, **29**, 2267–2284. DOI: 10.1175/2010JAMC2430.1.

2009 Rife, D. L., C. A. Davis, and J. C. Knievel, 2009: Temporal changes in wind as objects for evaluating numerical weather prediction. *Wea. Forecasting*, **24**, 1374–1389.

2007 Knievel, J. C., G. H. Bryan, and J. P. Hacker, 2007: Explicit numerical diffusion in the WRF Model. *Mon. Wea. Rev.*, **135**, 3808–3824.

 Warner, T. T., and coauthors, 2007: The Pentagon Shield Field Program: toward critical infrastructure protection. *Bull. Amer. Meteor. Soc.*, **88**, 167–176.

2006 Bryan, G. H., J. C. Knievel, and M. D. Parker, 2006: A multi-model assessment of RKW Theory's relevance to squall line characteristics. *Mon. Wea. Rev.*, **134**, 2772–2792.

2005 Hardwick, C. J., and J. C. Knievel, 2005: Speculations on the possible causes of the Whympet apparition. *Appl. Optics*, **44**, 5637–5643.

 Kusaka, H., A. Crook, J. C. Knievel, and J. Dudhia, 2005: Sensitivity of the WRF Model to advection and diffusion schemes for simulation of heavy rainfall along the Baiu Front. *SOLA*, **1**, 177–180.

 Lane, T. P., and J. C. Knievel, 2005: Some effects of model resolution on simulated gravity waves generated by deep, mesoscale convection. *J. Atmos. Sci.*, **62**, 3408–3418.

 Parker, M. D., and J. C. Knievel, 2005: Do meteorologists suppress thunderstorms? Radar-derived statistics and the behavior of moist convection. *Bull. Amer. Meteor. Soc.*, **86**, 341–358.

2004 Davis, C. A., and coauthors, 2004: The Bow Echo and MCV Experiment (BAMEX): observations and opportunities. *Bull. Amer. Meteor. Soc.*, **85**, 1075–1093.

 Knievel, J. C., D. A. Ahijevych, and K. W. Manning, 2004: Using temporal modes of rainfall to evaluate the performance of a numerical weather prediction model. *Mon. Wea. Rev.*, **132**, 2995–3009.

- Knievel, J. C., D. S. Nolan, and J. P. Kossin, 2004: Imbalance in a mesoscale vortex within a midlatitude, continental mesoscale convective system. *J. Atmos. Sci.*, **61**, 1827–1832.
- 2003 Knievel, J. C., and R. H. Johnson, 2003: A scale-discriminating vorticity budget for a mesoscale vortex in a midlatitude, continental mesoscale convective system. *J. Atmos. Sci.*, **60**, 781–794.
- 2002 Knievel, J. C., and R. H. Johnson, 2002: The kinematics of a midlatitude, continental mesoscale convective system and its mesoscale vortex. *Mon. Wea. Rev.*, **130**, 1749–1770.
- 1999 Petersen, W. A., L. D. Carey, S. A. Rutledge, J. C. Knivevel, N. J. Doesken, R. H. Johnson, T. B. McKee, T. Vonder Haar, and J. F. Weaver, 1999: Mesoscale and radar observations of the Fort Collins flash flood of 28 July 1997. *Bull. Amer. Meteor. Soc.*, **80**, 191–216.
- 1998 Knievel, J. C., and R. H. Johnson, 1998: Pressure transients within MCS mesohighs and wake lows. *Mon. Wea. Rev.*, **126**, 1907–1930.

WORK IN PREPARATION

- 2012 Liu, Y., J. C. Knivevel, T. M. Hopson, S. F. Halvorson, J. C. Pace, G. Roux, W. Wu, J. P. Hacker, S. E. Krippner, T. T. Warner, and S. P. Swerdlin, 2010: Mesoscale ensemble weather prediction at Dugway Proving Ground. *Mon. Wea. Rev.*, in preparation.

CONFERENCE PAPERS AND ABSTRACTS

- 2011 Copeland, J. H., J. C. Knivevel, F. Vandenberghe, and R. Babarsky, 2011: Unsupervised machine learning as a method to identify patterns in regional climate downscaling reanalyses. *9th Conference on Artificial Intelligence and its Applications to the Environmental Sciences, and 23rd Conference on Climate Variability and Change*, Seattle, WA, AMS. Abstract only.
- Liu, Y., T. Warner, S. Swerdlin, T. Betancourt, J. Knivevel, B. Mahoney, J. Pace, D. Rostkier-Edelstein, N. A. Jacobs, P. Childs, and K. Parks, 2011: NCAR ensemble RTFDDA: Real-time operational forecasting applications and new data assimilation developments. *24th Conference on Weather and Forecasting, and 12th Conference on Numerical Weather Prediction*, Seattle, WA, AMS. Abstract only.
- Wu, W., Y. Liu, J. A. Grim, F. Vandenberghe, A. Bourgeois, J. C. Knivevel, T. Warner, M. Padovani, G. Luft, and K. Fling, 2011: Simulating atmospheric boundary layer transition during a winter storm event with the WRF model. *24th Conference on Weather and Forecasting and 12th Conference on Numerical Weather Prediction*, Seattle, WA, AMS. Abstract only.
- 2010 Knievel, J. C., Y. Liu, S. F. Halvorson, J. Pace, G. Roux, W. Wu, J. P. Hacker, T. M. Hopson, S. Krippner, T. T. Warner, and S. P. Swerdlin, 2010: Mesoscale ensemble data assimilation and weather prediction at Dugway Proving Ground. *BACIMO⁸ Conference*, Omaha, NE, U. S. Director of Defense Research and Engineering, and Creighton University. Abstract only.
- Knievel, J. C., J. C. Pace, Y. Liu, T. M. Hopson, F. Vandenberghe, T. T. Warner, and S. P. Swerdlin, 2010: Toward high-fidelity, probabilistic, virtual atmospheres for defense modeling and simulation. *Chemical and Biological Defense Science and Technology (CBD S&T) Conference*, Orlando, FL, Defense Threat Reduction Agency. Abstract only.
- Liu, Y., T. T. Warner, S. P. Swerdlin, T. Betancourt, A. Bourgeois, G. Roux, W. Wu, Y. Liu, J. P. Hacker, D. Rife, T. M. Hopson, J. C. Knivevel, L. Carson, J. Copeland, P. Bieringer, J. Pace, S. F. Halvorson, S. Krippner, F. Gallagher, and J. A. Reynolds, 2010: The NCAR-ATEC 4-Dimensional Weather (4DWX) Modeling System: a tool for airborne hazard prediction. *BACIMO Conference*, Omaha, NE, U. S. Director of Defense Research and Engineering, and Creighton University. Abstract only.

- Rife, D., C. Davis, and J. Knievel, 2010: Evaluating temporal wind changes in mesoscale numerical forecasts using an object-based method. *Developmental Testbed Center Verification Workshop*, Boulder, CO, NCAR. Abstract only.
- Vandenberghe, F., R. R. Frehlich, R. Sharman, J. C. Knievel, W. Yu, and Y. Liu, 2010: Estimates of C_n^2 from numerical weather prediction model output. *BACIMO Conference*, Omaha, NE, U. S. Director of Defense Research and Engineering, and Creighton University. Abstract only.
- W. Wu, Y. Liu, J. Grim, F. Vandenberghe, A. Bourgeois, J. Knievel T. Warner, M. Padovani, G. Luft, and K. Fling, 2010: Simulated boundary layer structure and evolution in an Appalachian cold-air damming event with the WRF model. *19th Symposium on Boundary Layers and Turbulence*, Keystone, CO, AMS. Abstract only.
- W. Wu, Y. Liu, F. Vandenberghe, A. Bourgeois, J. Grim, J. Knievel, T. Warner, D. Stauffer, M. Padovani, G. Luft, and K. Fling, 2010: Evaluation of planetary boundary layer parameterizations in WRF3.2. *11th Annual WRF Users' Workshop*, Boulder, CO, NCAR. Abstract only.
- 2009 Halvorson, S. F., S. Krippner, J. Pace, Y. Liu, G. Roux, W. Wu, J. P. Hacker, T. M. Hopson, J. C. Knievel, T. T. Warner, and S. P. Swerdlin, 2009: E-4DWX: an operational mesoscale ensemble modeling system. Preprints, *23rd Conference on Weather Analysis and Forecasting, and 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS,⁹ 16A.1. [Available at <http://ams.confex.com/ams/pdfpapers/152959.pdf>.]
- Knievel, J. C., D. L. Rife, J. A. Grim, and M. Ge, 2009: Real-time forecasting for New York City and its surroundings, with emphasis on sea breezes and other coastal circulations. Preprints, *23rd Conference on Weather Analysis and Forecasting, and 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS. Abstract only.
- Knievel, J. C., D. L. Rife, J. A. Grim, A. N. Hahmann, J. P. Hacker, M. Ge, and H. H. Fisher, 2009: A technique for creating composite sea surface temperatures from NASA's MODIS instruments in order to improve numerical weather prediction. Preprints, *23rd Conference on Weather Analysis and Forecasting, and 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS, JP2.5. [Available at <http://ams.confex.com/ams/pdfpapers/154097.pdf>.]
- Liu, Y., T. T. Warner, S. P. Swerdlin, T. Betancourt, A. Bourgeois, G. Roux, W. Wu, Y. Liu, J. P. Hacker, D. Rife, T. M. Hopson, J. C. Knievel, L. Carson, J. Copeland, P. Bieringer, J. Pace, S. F. Halvorson, S. Krippner, F. Gallagher, and J. A. Reynolds, 2010: The NCAR-ATEC 4-Dimensional Weather (4DWX) Modeling System: A Tool for Airborne Hazard Prediction. *Chemical and Biological Defense Science and Technology Conference*, Dallas, TX, Defense Threat Reduction Agency (DTRA) Joint Science and Technology Office (JSTO). Abstract only.
- Liu, Y., T. Hopson, G. Roux, J. Hacker, M. Xu, J. Knievel, T. Warner, and S. Swerdlin, 2009: An operational mesoscale ensemble data assimilation and prediction system: E-RTFDDA. *EGU General Assembly 2009*, Vienna, Austria, European Geosciences Union. Abstract only.
- Liu, Y., G. Roux, M. Xu, T. Hopson, J. Hacker, J. Knievel, T. Warner, and S. Swerdlin, 2009: An operational mesoscale ensemble data assimilation and prediction system: E-RTFDDA. *16th Conference on Satellite Meteorology and Oceanography, and 5th Annual Symposium on Future Operational Environmental Satellite Systems—NPOESS and GOES-R*, Phoenix, AZ, AMS. Abstract only.
- Rife, D. L., C. A. Davis, and J. C. Knievel, 2009: Evaluating temporal wind changes in mesoscale numerical forecasts using an object-based method. Preprints, *23rd Conference on Weather Analysis and Forecasting, and 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS. Abstract only.

- 2008 Pace, J., E. Astling, S. Halvorson, Y. Liu, T. Betancourt, J. Hacker, J. Knievel, S. Swerdlin, and T. Warner, 2008: Use of HPC to provide operational mesoscale meteorological support for ATEC test ranges. Preprints, *HPCMP Users Group Conference*, Seattle, WA, Department of Defense High Performance Computing Modernization Program. [Available at <http://doi.ieeeecomputersociety.org/10.1109/DoD.HPCMP.UGC.2008.83>.]
- Knievel, J. C., G. H. Bryan, J. H. Copeland, and J. P. Hacker, 2008: The WRF Model's new explicit numerical diffusion and its effects on transport and dispersion in the planetary boundary layer. Preprints, *15th Conference on the Applications of Air Pollution Meteorology*, New Orleans, LA, AMS. [Available at <http://ams.confex.com/ams/pdffpapers/132741.pdf>.]
- 2006 Knievel, J. C., G. H. Bryan, and J. P. Hacker, 2006: Effects of high-order diffusion on circulations generated by land-surface heterogeneity in a numerical weather prediction model. *Fall Meeting of the AGU*,¹⁰ San Francisco, CA, AGU. Abstract only.
- Warner, T. T., J. C. Knievel, J. K. Lundquist, R. N. Fry, and J. R. Hannan, 2006: An operational forecasting system for the New York City Metropolitan Area that provides urban-scale input to NARAC and HPAC. *14th Joint Conference on the Applications of Air Pollution Meteorology with the Air and Waste Management Association, and 6th Symposium on the Urban Environment*, Atlanta, GA, AMS. Abstract only.
- 2005 Knievel, J. C., G. H. Bryan, and J. P. Hacker, 2005: Effects of explicit numerical diffusion in simulations of mesoscale circulations by the Advanced Research WRF Model. *11th Conference on Mesoscale Processes*, Albuquerque, NM, AMS. Abstract only.
- Knievel, J. C., G. H. Bryan, and J. P. Hacker, 2005: The utility of 6th-order, monotonic, numerical diffusion in the Advanced Research WRF Model. Preprints, *Joint MM5/WRF Users' Workshop*, Boulder, CO, NCAR, CD-ROM, 3.15. [Available at <http://www.mmm.ucar.edu/wrf/users/workshops/WS2005/abstracts/Session3/15-Knievel.pdf>.]
- Knievel, J. C., J. P. Hacker, and D. L. Rife, 2005: Evaluation of the Weather Research and Forecasting (WRF) Model as applied at the Army test ranges. *BACIMO Conference*, Monterey, CA, U. S. Director of Defense Research and Engineering. Abstract only.
- 2004 Ahijevych, D. A., G. H. Bryan, C. A. Davis, J. C. Knievel, S. B. Trier, and M. L. Weisman, 2004: System-relative distribution of dropsondes during BAMEX and lessons learned. Preprints, *22nd Conference on Severe Local Storms*, Hyannis, MA, AMS, CD-ROM, 5.6.
- Bryan, G. H., and J. C. Knievel, 2004: Recommendations for diffusion in idealized squall line simulations by the WRF Model. Preprints, *WRF/MM5 Joint Workshop*, Boulder, CO, NCAR, 233–236.
- Bryan, G. H., J. C. Knievel, and M. D. Parker, 2004: An intercomparison of simulated squall lines in varying shear. Preprints, *22nd Conference on Severe Local Storms*, Hyannis, MA, AMS, CD-ROM, P6.2.
- Copeland, J. C., T. T. Warner, S. P. Swerdlin, and J. C. Knievel, 2004: An integrated approach to defining realtime upwind threat zones. Preprints, *13th Joint Conference on the Applications of Air Pollution Meteorology with the Air and Waste Management Association*, Vancouver, BC, Canada, AMS, CD-ROM, 6.3.
- Edwards, B. L., M. A. LeMone, and J. C. Knievel, 2004: Analyzing the accuracy of using surface data to estimate water vapor content throughout the boundary layer. *3rd Student Conference, 84th Annual Meeting of the AMS*, Seattle, WA, AMS. Abstract only.
- Knievel, J. C., D. A. Ahijevych, and K. W. Manning, 2004: The diurnal mode of summer rainfall across the conterminous United States in 10-km simulations by the WRF Model. Preprints, *16th Conference on Numerical Weather Prediction*, Seattle, WA, AMS, CD-ROM, 17.2.

- Knievel, J. C., B. B. Balsley, J. F. Bowers, K. L. Clawson, J. H. Copeland, R. G. Frehlich, S. D. Mayor, R. D. Sharman, S. M. Spuler, D. P. Storz, S. Swerdlin, T. T. Warner, and J. C. Weil, 2004: An overview of the Pentagon Shield 2004 field campaign. Preprints, *5th Symposium on the Urban Environment*, Vancouver, BC, Canada, AMS, CD-ROM, 1.3.
- Parker, M. D., and J. C. Knivevel, 2004: Are there weather holes? An objective analysis. Preprints, *20th Conference on Weather Analysis and Forecasting*, Seattle, WA, AMS, CD-ROM, P1.37.
- Weil, J. C., K. L. Clawson, J. F. Bowers, M. L. Jensen, S. D. Mayor, and J. C. Knivevel, 2004: Field experiments on tracer dispersion about the Pentagon. *8th George Mason University Transport and Dispersion Modeling Workshop*, Fairfax, VA, George Mason University. Abstract only.
- 2003 Parker, M. D., and J. C. Knivevel, 2003: Are there mesoscale, convective “weather holes”? Preprints, *10th Conference on Mesoscale Processes*, Portland, OR, AMS, CD-ROM, P1.13.
- 2002 Knivevel, J. C., 2002: A comparison of convectively generated mesoscale vortices in the United States and in China. Preprints, *21st Conference on Severe Local Storms*, San Antonio, TX, AMS, 62–65.
- Knivevel, J. C., 2002: Examples of the resolution sensitivity of MCS forecasts by the WRF Model. *Mini-forum on Prediction and Observation of Mesoscale Meteorological Phenomena*, Tokyo, Japan, Japanese Meteorological Agency. Abstract only.
- Knivevel, J. C., R. H. Johnson, D. S. Nolan, and J. P. Kossin, 2002: The degree of balance in a midlatitude, continental mesoscale convective vortex. Preprints, *21st Conference on Severe Local Storms*, San Antonio, TX, AMS, 42–45.
- 2001 Knivevel, J. C., and R. H. Johnson, 2001: The kinematics of a mesoscale convective system and its mesoscale convective vortex. Preprints, *9th Conference on Mesoscale Processes*, Fort Lauderdale, FL, AMS, 415–419.
- Knivevel, J. C., and R. H. Johnson, 2001: A scale-discriminating vorticity budget for a mesoscale convective vortex. Preprints, *9th Conference on Mesoscale Processes*, Fort Lauderdale, FL, AMS, 396–400.
- 2000 Knivevel, J. C., 2000: The local wind of an MCS and a vorticity budget for the mesoscale convective vortex within it. Preprints, *20th Conference on Severe Local Storms*, Orlando, FL, AMS, 331–334.
- 1999 Johnson, R. H., P. E. Ciesielski, J. C. Knivevel, and M. D. Parker, 1999: Preliminary results from the South China Sea Monsoon Experiment sounding network. Preprints, *23rd Conference on Hurricanes and Tropical Meteorology*, Dallas, TX, AMS, 969–972.
- 1998 Knivevel, J. C., and R. H. Johnson, 1998: The 28 July 1997 Fort Collins flood: synoptic and mesoscale analyses. Preprints, *19th Conference on Severe Local Storms*, Bloomington, MN, AMS, 396–399.
- 1995 Knivevel, J. C., and R. H. Johnson, 1995: Surface pressure transients during and after the passage of midlatitude MCSs. *XXII General Assembly of the IUGG*, Boulder, CO, IUGG.¹¹ Abstract only.

OTHER PUBLICATIONS

- 2003 Knivevel, J. C., 2003: The kinematics and thermodynamics of a midlatitude, continental mesoscale convective system and its mesoscale vortex. Atmospheric Science Paper No. 730, CSU, 99 pp.
- 2002 McCarty, J. E., and J. C. Knivevel, 2002: Review of “World Almanac Video’s Guide to Extreme Weather,” Choices, Inc., *Library J.*, **127**, 149–50.
- 1997 Knivevel, J. C., 1997: Air pressure. *Encyclopedia of Earth and Physical Sciences*, **Vol. 1**, Marshal Cavendish, New York, New York.
- Knivevel, J. C., 1997: Global warming. *Encyclopedia of Earth and Physical Sciences*, **Vol. 4**, Marshal Cavendish, New York, New York.

Knievel, J. C., 1997: Rain, snow, and sleet. *Encyclopedia of Earth and Physical Sciences*, **Vol. 8**, Marshal Cavendish, New York, New York.

Knievel, J. C., 1997: Stratosphere. *Encyclopedia of Earth and Physical Sciences*, **Vol. 9**, Marshal Cavendish, New York, New York.

Knievel, J. C., 1997: Wind. *Encyclopedia of Earth and Physical Sciences*, **Vol. 10**, Marshal Cavendish, New York, New York.

Knievel, J. C., and Z. A. Eitzen, 1997: Monsoon. *Encyclopedia of Earth and Physical Sciences*, **Vol. 5**, Marshal Cavendish, New York, New York.

1996 Knievel, J. C., 1996: Surface pressure transients in mesoscale convective systems. Atmospheric Science Paper No. 605, CSU, 131 pp.

INVITED TALKS

- 03/07/2011 Ten steps to better technical talks. Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Roskilde, Denmark.
- 03/03/2011 Composite sea-surface temperatures from NASA's MODIS instruments for improved mesoscale weather prediction. Risø National Laboratory for Sustainable Energy, Technical University of Denmark, Roskilde, Denmark.
- 06/05/2010 Something in the air: weather, climate, and national security. *Celebration of the 50th Anniversary of UCAR*,¹² Boulder, CO, UCAR.
- 12/12/2007 Atmospheric environment support for the warfighter. *13th Annual ITEA*¹³ *Conference*, Las Cruces, NM, ITEA.
- 12/12/2007 Mesoscale climate reanalysis as a tool for planning outdoor tests. *13th Annual ITEA Conference*, Las Cruces, NM, ITEA.
- 03/19/2007 Beyond "sunny and 75": tailored forecasts and NCAR's 4DWX system. North Carolina State University, Raleigh, NC.
- 01/26/2006 Hurricanes. Redstone Elementary School, Highlands Ranch, CO.
- 12/09/2003 Diurnal rainfall in the WRF Model. Seoul National University, Seoul, South Korea.
- 11/01/2002 Examples of the resolution sensitivity of MCS forecasts by the WRF Model. *Mini-forum on Prediction and Observation of Mesoscale Meteorological Phenomena*, Tokyo, Japan, Japanese Meteorological Agency.
- 10/05/2001 Vorticity and gradient balance in a mesoscale convective vortex. National Severe Storms Laboratory, Norman, OK.
- 03/21/2001 Vorticity and gradient balance in a mesoscale convective vortex. Department of Physics, Astronomy, and Meteorology, Western Connecticut State University, Danbury, CT.
- 01/24/2001 Why it is wrong to say that warm air holds more water vapor than cold air holds. Department of Earth Science, California University of Pennsylvania, California, PA.
- 02/17/1998 El Niño. The Kiwanis Club, Fort Collins, CO.

OTHER SELECTED TALKS AND POSTERS

- 06/17/2011 Some advice for undergraduates. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 06/14/2011 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.

- 11/16/2010 Toward high-fidelity, probabilistic, virtual atmospheres for defense modeling and simulation. *Chemical and Biological Defense Science and Technology (CBD S&T) Conference*, Orlando, FL.
- 10/08/2010 Weather, storms, and safety. St. John the Baptist School, Longmont, CO.
- 06/30/2010 Ten steps to better technical talks. SOARS,¹⁴ Boulder, CO, UCAR.
- 06/16/2010 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 05/27/2010 RAL overview: science in service to society. *Meeting of the Chevron Group*, Boulder, CO, NCAR.
- 05/04/2010 4DWX: lessons in anatomy, etymology, and archaeology. *2010 ATEC Forecaster Training, Part 2*, Boulder, CO, NCAR.
- 04/14/2010 Mesoscale ensemble data assimilation and weather prediction at Dugway Proving Ground. *BACIMO Conference*, Omaha, NE, U. S. Director of Defense Research and Engineering, and Creighton University.
- 04/14/2010 The NCAR-ATEC 4-Dimensional Weather (4DWX) Modeling System: a tool for airborne hazard prediction. *BACIMO Conference*, Omaha, NE, U. S. Director of Defense Research and Engineering, and Creighton University.
- 02/23/2010 4DWX: lessons in anatomy, etymology, and archaeology. *2010 ATEC Forecaster Training, Part 1*, Boulder, CO, NCAR.
- 06/17/2009 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 06/02/2009 A technique for creating composite sea surface temperatures from NASA's MODIS instruments in order to improve numerical weather prediction. *23rd Conference on Weather Analysis and Forecasting / 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS.
- 06/01/2009 Real-time forecasting for New York City and its surroundings, with emphasis on sea breezes and other coastal circulations. *23rd Conference on Weather Analysis and Forecasting / 19th Conference on Numerical Weather Prediction*, Omaha, NE, AMS.
- 05/19/2009 Gridded bias correction. *2009 ATEC Forecaster Training, Part 2*, Boulder, CO, NCAR.
- 05/19/2009 NCAR and the Research Applications Laboratory. *2009 ATEC Forecaster Training, Part 2*, Boulder, CO, NCAR.
- 02/24/2009 NCAR and the Research Applications Laboratory. *2009 ATEC Forecaster Training, Part 1*, Boulder, CO, NCAR.
- 12/18/2008 Forecasting for New York City and its surroundings, with emphasis on sea-surface temperature's effect on sea breezes and other coastal circulations that influence air quality. *Fall Meeting of the AGU*, San Francisco, CA, AGU.
- 06/18/2008 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 02/26/2008 Physical parameterizations in the WRF Model. *2007/2008 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 01/23/2008 The WRF Model's new explicit numerical diffusion and its effects on transport and dispersion in the planetary boundary layer. *15th Conference on the Applications of Air Pollution Meteorology*, New Orleans, LA, AMS.
- 11/08/2007 Climate FDDA. Laboratory retreat, Estes Park, CO, Research Applications Laboratory, NCAR.
- 07/17/2007 Physical parameterizations in the WRF Model. *2007/2008 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.

- 06/20/2007 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 12/14/2006 Effects of high-order diffusion on circulations generated by land-surface heterogeneity in a numerical weather prediction model. *Fall Meeting of the AGU*, San Francisco, CA, AGU.
- 10/25/2006 Forecasting in the ATEC Project, with emphasis on short-term numerical prediction. Program retreat, Boulder, CO, Convective Weather Program, NCAR.
- 08/09/2006 Lake-effect precipitation from the Great Salt Lake. *2006 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 08/09/2006 The North American monsoon and flash floods. *2006 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 08/08/2006 Numerical weather prediction (NWP) and the WRF Model. *2006 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 07/26/2006 Lake-effect precipitation from the Great Salt Lake. *2006 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.
- 07/26/2006 The North American Monsoon and flash floods. *2006 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.
- 07/25/2006 Numerical weather prediction (NWP) and the WRF Model. *2006 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.
- 06/21/2006 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 10/12/2005 Evaluation of the Weather Research and Forecasting (WRF) Model as applied at the Army test ranges. *BACIMO Conference*, Monterey, CA, U. S. Director of Defense Research and Engineering.
- 10/06/2005 Ten steps to better technical talks. Laboratory retreat, Estes Park, CO, Research Applications Laboratory, NCAR.
- 10/06/2005 The utility of 6th-order, monotonic, numerical diffusion in the Advanced Research WRF Model. Laboratory retreat, Estes Park, CO, Research Applications Laboratory, NCAR.
- 08/18/2005 Chaos and ensemble forecasting. *2005 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 08/18/2005 The WRF Model vs. MM5. *2005 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 08/16/2005 Mesoscale vs. synoptic forecasting. *2005 ATEC Forecaster Conference, Part 2*, Boulder, CO, NCAR.
- 07/28/2005 The WRF Model vs. MM5. *2005 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.
- 07/26/2005 Mesoscale vs. synoptic forecasting. *2005 ATEC Forecaster Conference, Part 1*, Boulder, CO, NCAR.
- 06/27/2005 The utility of 6th-order, monotonic, numerical diffusion in the Advanced Research WRF Model. *Joint MM5/WRF Users' Workshop*, Boulder, CO, NCAR.
- 06/22/2005 NCAR's Research Applications Laboratory. *Undergraduate Leadership Workshop*, Boulder, CO, NCAR.
- 11/17/2004 Ten easy steps to better scientific talks. Group Retreat, Boulder, CO, Research Applications Laboratory, NCAR.
- 10/07/2004 The transition from the MM5 to the WRF Model in NCAR's Four-Dimensional Weather System (4DWX). *11th Conference on Aviation, Range, and Aerospace Meteorology*, Hyannis, MA, AMS.
- 10/06/2004 An evaluation of "RKW Theory" using a model intercomparison. *22nd Conference on Severe Local Storms*, Hyannis, MA, AMS.

- 08/26/2004 An overview of the Pentagon Shield 2004 field campaign. *5th Symposium on the Urban Environment*, Vancouver, BC, Canada, AMS.
- 06/24/2004 Recommendations for diffusion in idealized squall line simulations by the WRF Model. *WRF/MM5 Joint Workshop*, NCAR, Boulder, CO.
- 03/01/2004 Current status of BAMEX dropsonde data. *BAMEX Workshop*, Fairview Heights, IL, NCAR and other sponsors.
- 02/09/2004 The diurnal mode of summer rainfall across the conterminous United States in 10-km simulations by the WRF Model. Public Visitors Program, UCAR, Boulder, CO.
- 01/14/2004 The diurnal mode of summer rainfall across the conterminous United States in 10-km simulations by the WRF Model. *16th Conference on Numerical Weather Prediction*, Seattle, WA, AMS.
- 01/12/2004 Are there weather holes? An objective analysis. *20th Conference on Weather Analysis and Forecasting*, Seattle, WA, AMS.
- 10/28/2003 The realism of rainfall patterns in preliminary versions of the Weather Research and Forecasting (WRF) Model. Public Visitors Program, UCAR, Boulder, CO.
- 06/24/2003 A few simulations that address the WRF Model's ability to reproduce patterns of warm-season rainfall in the Great Plains. *10th Conference on Mesoscale Processes*, Portland, OR, AMS.
- 06/12/2003 The 22-km WRF Model's diurnal and semi-diurnal modes of summer rainfall across the contiguous United States. *4th Weather Research and Forecasting Modeling System Users' Workshop*, Boulder, CO, NCAR.
- 06/12/2003 On the WRF Model's ability to reproduce patterns of rainfall from summer MCSs in the central United States. *4th Weather Research and Forecasting Modeling System Users' Workshop*, Boulder, CO, NCAR.
- 04/01/2003 Unconventional evaluation of rainfall forecasts from numerical models. *2nd NCAR/CAMS Joint Workshop on NWP Model Development*, Beijing, China, Chinese Academy of Meteorological Sciences.
- 02/16/2003 An introduction to the new Weather Research and Forecasting (WRF) Model. *Annual Meeting of the AAAS*, Denver, CO, American Association for the Advancement of Science.
- 09/30/2002 A scale-discriminating vorticity budget for a mesoscale convective vortex. *2nd Annual Early Career Scientists' Assembly*, Boulder, CO, NCAR.
- 08/12/2002 A comparison of convectively generated mesoscale vortices in the United States and in China. *21st Conference on Severe Local Storms*, San Antonio, TX, AMS.
- 08/12/2002 The degree of balance in a midlatitude, continental mesoscale convective vortex. *21st Conference on Severe Local Storms*, San Antonio, TX, AMS.
- 05/09/2002 Convectively generated mesoscale vortices. NRC staff site visit, NOAA,¹⁵ Boulder, CO.
- 08/01/2001 The kinematics of a mesoscale convective system and its mesoscale convective vortex. *9th Conference on Mesoscale Processes*, Fort Lauderdale, FL, AMS.
- 08/01/2001 A scale-discriminating vorticity budget for a mesoscale convective vortex. *9th Conference on Mesoscale Processes*, Fort Lauderdale, FL, AMS.
- 06/22/2001 The kinematics and thermodynamics of a midlatitude, continental mesoscale convective system and its mesoscale vortex. Ph. D. defense seminar. Department of Atmospheric Science, CSU.
- 09/13/2000 The local wind of an MCS and a vorticity budget for the mesoscale convective vortex within it. *20th Conference on Severe Local Storms*, Orlando, FL, AMS.
- 10/16/1998 The 28 July 1997 Fort Collins flood: synoptic and mesoscale analyses. *19th Conference on Severe Local Storms*, Bloomington, MN, AMS.

- 02/23/1996 Surface pressure transients in mesoscale convective systems. M. S. defense seminar. Department of Atmospheric Science, CSU.
- 07/06/1995 Surface pressure transients during and after the passage of midlatitude MCSs. *XXII General Assembly of the IUGG*, Boulder, CO, IUGG.

FIELD PROJECTS

- 09/11– **Mountain Terrain Atmospheric Modeling and Observations Program (Materhorn)**
Collaborator and external advisor on numerical weather prediction at Dugway Proving Ground
- 09/07–09/07 **Fusing Sensor Information from Observing Networks (FUSION) Field Trial 2007 (FFT07)**
Coordinator of WRF Model ensemble simulations
- 10/06–03/07 **Canadian CloudSat/CALIPSO Validation Project (C3VP)**
Coordinator of WRF Model simulations
- 10/05–11/05 **Pentagon Shield II**
Principal coordinator of outdoor tests
- 04/04–05/04 **Pentagon Shield I**
Part-time assistant coordinator and data analyst
- 05/03–07/03 **Bow Echo and MCV Experiment (BAMEX)**
Dropsonde coordinator
- 01/02–02/02 **Pacific Landfalling Jets Experiment (PACJET)**
Doppler radar scientist
- 11/99–12/99 **Complex Layered Cloud Experiment 5 (CLEX-5)**
Mission forecaster
- 05/98–08/98 **South China Sea Monsoon Experiment (SCSMEX)**
Quality controller of soundings
- 06/96–07/96 **Complex Layered Cloud Experiment (CLEX)**
Mission forecaster
- 11/92–02/93 **Tropical Ocean Global Atmosphere Coupled Ocean–Atmosphere Response Experiment (TOGA COARE)**
Quality controller of soundings

FUNDED PROPOSALS

- 2011 **Co-awardee**, visitor travel grant, Early Career Scientists Assembly, NCAR. \$7,341.00 sponsorship for Song-Lak Kang.
- 2006–2011 **Principal investigator (since 2011) and co-investigator (before 2011)**, “Development of a Four-Dimensional Weather System (4DWX),” ATEC. \$3,000,000–\$4,960,000 per year, renewed annually.
- 2006 **Co-investigator**, “Weather-encounter-software modeling environment using climatological and high-resolution weather data,” SBIR¹⁶ Program, U. S. Department of Defense. \$20,000 over 1 year.
- 2001 **Recipient**, research associateship, NRC. \$36,000 over 1 year.
- 1999 **Recipient**, student travel grant, AMS.

SELECTED PROFESSIONAL AND ACADEMIC SERVICE

Editorial positions

2007–2009 Associate editor, *Monthly Weather Review*

Committees, councils, boards, and panels

2011– Member, publication award committee, Research Applications Laboratory, NCAR
 2010– Member, search committee for postdoctoral fellows, Advanced Study Program, NCAR
 2009– Member, Verification Advisory Group, Research Applications Laboratory, NCAR
 1996–2011 Member and sometimes head, ten employment search committees, CSU and NCAR
 2010 Member, panel on careers in atmospheric science, Undergraduate Leadership Workshop, UCAR
 2010 Moderator, panel discussion on the Project Scientist position, NCAR Scientist Assembly
 2007 Member, planning committee for laboratory retreat, Research Applications Laboratory, NCAR
 2004 Member, steering committee and subcommittees, Communicating Science Initiative, UCAR
 1999–2000 Representative of the Department of Atmospheric Science, Graduate Student Council, CSU
 1997–1998 Ph. D. student representative to the departmental faculty, Department of Atmospheric Science, CSU
 1996–1997 M. S. student representative to the departmental faculty, Department of Atmospheric Science, CSU
 1991 Acting president, Campus Weather Service, PSU
 1990–1991 Treasurer, Campus Weather Service, PSU

Conferences, meetings, workshops, and symposia

2005– Co-organizer and co-host, *Annual ATEC Forecaster Training (née Forecaster Conference)*, Boulder, CO, NCAR and ATEC
 2010 Chairman, Session on Verification Through Time, *Workshop on Verification*, Developmental Testbed Center, NCAR
 2008 Chairman, Session on Air Quality, Photochemical Processes, and Complex Meteorology IV, *Fall Meeting*, AGU
 2006 Chairman, Session on Importance of Land-Surface Heterogeneity to Weather and Weather Prediction II, *Fall Meeting*, AGU
 2003 Chairman, Session on Organized Convective Systems, *10th Conference on Mesoscale Processes*, AMS

Peer review

2005– Grant proposals: *National Science Foundation*
 1997– Scientific journals: *Atmospheric Science Letters*, *Geophysical Research Letters*, *Journal of Applied Meteorology*, *Journal of the Atmospheric Sciences*, *Monthly Weather Review*, *Quarterly Journal of the Royal Meteorological Society*, *Tellus*, *Weather and Forecasting*

Supervision and mentorship

2009– Supervisor, Yuewei Liu, NCAR
 2009– Mentor, Linlin Pan, NCAR
 2007– Supervisor, Ming Ge, NCAR
 2009–2011 Coordinator at NCAR, Forecaster Internship Program, ATEC
 2009–2011 Mentor, Forecaster Internship Program, ATEC
 2009–2010 Mentor, Ka Yee Wong, NCAR
 2006–2007 Supervisor, Paul Bieringer, NCAR
 2006 Supervisor, Julie Schramm, NCAR
 2004–2005 Mentor, Forecaster Internship Program, ATEC
 2004 Research co-mentor, SOARS, UCAR
 2003 Writing mentor, SOARS, UCAR

Graduate committees

- 2010–2011 Ph.D., Claire Vincent, Technical University of Denmark
 2008–2011 Ph.D., Ming Ge, CU

K–12 education

- 2010–2011 Judge at science fairs, Boulder Valley School District, Boulder, CO
 2007 Member of judging panel, GLOBE¹⁷ Project Learning Expedition
 2003–2007 Judge at science fairs, Boulder Valley School District, Boulder, CO
 1995 Co-instructor and co-developer, elementary school workshop on weather, Poudre School District, Fort Collins, CO

Miscellaneous volunteerism

- 2009– Coordinator of seminar series, Research Applications Laboratory, NCAR
 2005–2006 Co-coordinator of seminar series, Research Applications Laboratory, NCAR
 2003–2004 Co-coordinator of seminar series, Mesoscale and Microscale Meteorology Division, NCAR

SELECTED AWARDS AND HONORS

- 2011 *You're a Star* award, UCAR Finance and Administration (for activity above and beyond normal job function)
 2006 Nomination, Outstanding Technical Achievement of the Year, NCAR (for Pentagon Shield project)
 2002 Highlight conference presentation, AMS (for "A comparison of convectively generated . . .")
 2002 Paper of Note, AMS (for "The kinematics of a midlatitude, continental . . .")
 2001 Membership, Phi Kappa Phi National Honor Society
 2000 Honorable mention, Best Student Oral Presentation, *20th Conference on Severe Local Storms*, AMS
 1998 Graduate Research Award of Excellence, College of Engineering, CSU (awarded annually to the single outstanding graduate research assistant in the college)
 1994, 1997 Top forecaster, mesoscale weather forecasting contest, CSU
 1996 Invited forecaster, 30th Annual Rocky Mountain Soaring Contest
 1992 Student marshal, fall graduation, College of Earth and Mineral Sciences, PSU (awarded to the student ranked first in college's graduating class)
 1991 Membership, Chi Epsilon Pi Meteorology Honor Society
 1991 Membership, Golden Key National Honor Society
 1991 Edwin L. Drake Memorial Scholarship, College of Earth and Mineral Sciences, PSU
 1990 First place, National Collegiate Forecasting Contest (forecasts for Missoula, MT)
 1989 John and Elizabeth Holmes Teas Scholarships, PSU
 1988 Knights of Columbus Scholarship, State College, PA
 1988 Dean's Freshman Scholarship, PSU

PROFESSIONAL AND SCHOLARLY AFFILIATIONS

- 2005– International Test and Evaluation Association
 2002– National Weather Association
 2001– American Association for the Advancement of Science
 1997– American Geophysical Union
 1996– American Meteorological Society

COMPUTER LITERACY

Operating systems

UNIX, Linux, Macintosh OS X, Windows 95/98

Programming, scripting, and markup

FORTRAN 77/90, Perl, Python, C shell, HTML, CSS

Data analysis and display

GrADS, IDL, IDV, NCL, RIP, ncview

Word processing and typesetting

MS Word, LaTeX, TeX

Other software and applications

Adobe Acrobat, Adobe Illustrator, Adobe Dreamweaver, MS Excel, MS PowerPoint

Key to acronyms

¹ATEC = U. S. Army Test and Evaluation Command; 4DWX = Four-Dimensional Weather System

²NGIC = National Ground Intelligence Center; GCAT = Global Climatology Analysis Toolkit

³NCAR = National Center for Atmospheric Research, Boulder, CO

⁴NRC = National Research Council of the National Academy of Sciences

⁵CSU = Colorado State University, Fort Collins, CO

⁶CU = University of Colorado, Boulder, CO

⁷PSU = The Pennsylvania State University, University Park, PA

⁸BACIMO = Battlespace Atmospheric and Cloud Impacts on Military Operations

⁹AMS = American Meteorological Society

¹⁰AGU = American Geophysical Union

¹¹IUGG = International Union of Geodesy and Geophysics

¹²UCAR = University Corporation for Atmospheric Research, Boulder, CO

¹³ITEA = International Test and Evaluation Association

¹⁴SOARS = Significant Opportunities in Atmospheric Research and Science

¹⁵NOAA = National Oceanic and Atmospheric Administration

¹⁶SBIR = Small Business Innovation Research

¹⁷GLOBE = Global Learning and Observations to Benefit the Environment