

Curriculum Vitae

ROBERT JEFFREY TRAPP

Department of Earth and Atmospheric Sciences
Purdue University
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EDUCATION

The University of Oklahoma, Ph.D. in Meteorology, 1994
Dissertation: *Numerical Simulation of the Genesis of Tornado-Like Vortices*
Principal Advisor: Prof. Brian H. Fiedler

Texas A&M University, M.S. in Meteorology, 1989
Thesis: *The Effects of Cloud Base Rotation on Microburst Dynamics-A Numerical Investigation*
Principal Advisor: Prof. P. Das

University of Missouri-Columbia, B.S. in Agriculture/Atmospheric Science, 1985

APPOINTMENTS

Associate Professor, Department of Earth and Atmospheric Sciences, Purdue University, August 2003-present

Research Scientist, Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma, and National Severe Storms Laboratory, July 1996-July 2003

Visiting Scientist, National Center for Atmospheric Research, Mesoscale and Microscale Meteorology Division, August 1998-December 2002

National Research Council Postdoctoral Research Fellow, at the National Severe Storms Laboratory, July 1994-June 1996

GRANTS AND FUNDING

Principal Investigator, *The DOW Radar Observations at Purdue study (DROPs)*, NSF Facilities for Education, \$21,680 (to the Center for Severe Weather Research, J. Wurman), 2009.

Co-Principal Investigator, *The Application of a Successful Research-Based Laboratory Model to Atmospheric Science*, NSF CCLI, \$150,000, 2009-2011.

Principal Investigator, *The Response of Convective Precipitating Storms to Anthropogenically Enhanced Global Radiative Forcing*, ATM-0756624, \$616,112, 2008-2010.

Principal Investigator, *Collaborative Research: Multi-scale and Multi-Platform Study of Tornadoes, Supercell Thunderstorms, and their Parent Environments in VORTEX2*, ATM-0758588, \$57,769, 2008-2012.

Co-Principal Investigator, *An experimental, real-time prediction system for high-impact convective weather events*, COMET Cooperative Research Project, \$46,405, 2007-2008.

Principal Investigator, *Sub-daily scale extreme precipitation in future climate-change scenarios*, NSF grant ATM-0541491, \$275,075, 2006-2008.

Principal Investigator: *Equipment to Enhance the Capacity to Process and Disseminate Value-Added Weather Data at Purdue University*, Unidata/UCAR, \$7000, 2005.

Principal Investigator, *Quantification of damaging wind characteristics in tornadoes*, Purdue Research Foundation, \$13,776, 2005-2006.

Principal Investigator: *Collaborative research: Damage analysis and numerical simulation of convectively driven wind events during BAMEX*, NSF grant ATM-0233344, \$368,115, 2003-2006.

Principal Investigator: *The formation and climatological distribution of tornadoes within quasi-linear convective systems*, NSF grant ATM-0100016, \$175,204, 2001-2003.

Principal Investigator: *An evaluation of the warning utility of tornadic vortex signatures detected by WSR-88D radars*, COMET Cooperative Research Project, Subaward UCAR S97-86995 \$26,000, 1997-1998.

PROFESSIONAL ACTIVITIES

Editor, *Monthly Weather Review*, 2008-present

Participant, Workshop on Progress and Priorities of US Weather Research and Research-to-Operations Activities, sponsored by the Board on Atmospheric Sciences and Climate, National Academy of Science, 2009

Contributing Author, U.S. Climate Change Science Program, Synthesis and Assessment Product 3.3, "Weather and Climate Extremes in a Changing Climate", 2007

Faculty Advisor, Purdue University Meteorological Association (PUMA), 2003-2007

Co-Principal Investigator, VORTEX2 (Verification of the Origins of Rotation in Tornadoes EXperiment-2), 2008-present

Participant, NOAA Hazardous Weather Testbed - Experimental Forecast Program, 2005, 2007

Member, Executive Committee, Purdue Climate Change Research Center, 2007-present

Associate Editor, *Weather and Forecasting*, 2001-2003

Associate Editor, *Monthly Weather Review*, 2002-2003; 2006-2007

Steering Committee Member and Co-Principal Investigator, BAMEX (Bow echo and MCV Experiment), 2000-2003

Co-Principal Investigator, IPEX (Intermountain Precipitation Experiment), 2000

Chair, AMS Scientific and Technological Activities Committee on Severe Local Storms, 2001-2003;

Member, 1999-2000

Chair, program committee, 20th AMS *Conference on Severe Local Storms*, 1999-2000; Member, program committees, 1998; 2002; 2004

Session chair: 18th, 19th, 20th, 22nd, 24th AMS *Conferences on Severe Local Storms*

Research mentor, SOARS (Significant Opportunities in Atmospheric Research and Science), 1999, 2000

Chair, program committee, *Golden Jubilee Symposium on Tornado Forecasting*, 1998

TEACHING

Introduction to Atmospheric Science (EAS 221), *Atmospheric Dynamics I* (EAS 422), *Radar Meteorology* (EAS 523), *Weather Analysis and Forecasting* (EAS 434), *Climate and Extreme Weather Seminar* (EAS 591), *Mesoscale Meteorology* (EAS 636)

EAS TEACHING HONOR ROLL: Spring 2004, Fall 2004, Spring 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009

STUDENTS ADVISED

● CURRENT (GRADUATE):

Nathan Hitchens – Ph.D., anticipated May 2010

Eric Robinson – Ph.D., anticipated May 2013

Mallie Toth – M.S., anticipated May 2011

● PAST (GRADUATE):

Elaine Godfrey – M.S., received December 2003 (co-advised, Univ. of Oklahoma)

Dustan Wheatley - M.S., received May 2004

Brooke Halvorson – M.S., received July 2006

Kent Knopfmeier – M.S., received May 2007

Dustan Wheatley – Ph.D., received December 2007

Karen Kosiba – Ph.D., received May 2009

● UNDERGRADUATES:

Kent Knopfmeier – B.S., received May 2005

Anthony Reinhart – B.S., received May 2007

Mark Nance – B.S., received May 2007

Eric Robinson – B.S. (in Physics), received May 2008

Dustin Pittman – B.S., anticipated May 2010

● SERVICE ON GRADUATE COMMITTEES:

Angela Lese - M.S., received December 2003

Jonathan Chamberlain – M.S., received May 2004

Hong-bing Zhang - M.S., received December 2004

Aisha Reed – M.S., received December 2005

Justin Stachnik – M.S., received August 2007

Kevin Vermeesch – M.S., received August 2007

Colleen Henry – Ph.D., received May 2008

Megan Walker – M.S., received July 2008

Dan Arthur – M.S., received May 2009

Erin Jones – M.S., anticipated July 2009
Moetasim Ashfaq – Ph.D., anticipated July 2009
Cecille Villanueva Birriel – M.S., anticipated May 2010
Yi-Chi Wang – Ph.D., anticipated May 2011
Jacob Carley – Ph.D., anticipated May 2013

HONORS AND AWARDS

Outstanding Teacher in the College of Science, Purdue University, 2007
NOAA/Cooperative Institute for Mesoscale Meteorological Studies, Outstanding Paper Award, 2005
NOAA/Environmental Research Laboratory, Outstanding Paper Award, 2002
NOAA/Environmental Research Laboratory, Outstanding Paper Award, 2000
Who's Who in Science and Engineering, 2000

PROFESSIONAL SOCIETY MEMBERSHIPS

American Meteorological Society
Sigma Xi
American Geophysical Union

PUBLICATIONS

● BOOKS

Mesoscale-Convective Processes in the Atmosphere, Cambridge University Press (scheduled for delivery in 2009).

● FORMAL, IN PREPARATION:

Wheatley, D. M., and **R. J. Trapp**, 2009: Assimilation of surface observations using the ensemble Kalman filter: Effect of improved representation of the mesoscale environment on squall line structure and evolution. *Monthly Weather Review*, to be submitted.

Knopfmeier, K. H., **R. J. Trapp**, and D. M. Wheatley, 2009: Role of an external boundary in bow-echo development and subsequent low-level mesovortexgenesis. *Weather and Forecasting*, to be submitted.

● FORMAL, IN REVIEW:

Trapp, R. J., E. D. Robinson, M. E. Baldwin, and N. S. Diffenbaugh, 2009: Transmission of large-scale forcing to convective-scale hazardous weather statistics through high-resolution dynamical downscaling. *Climate Dynamics*, in review.

● FORMAL, IN PRESS:

Hitchens, N., **R. J. Trapp**, M. E. Baldwin, and A. Gluhovsky, 2009: Characterizing sub-diurnal extreme precipitation in the Midwestern United States. *Journal of Hydrometeorology*, in press.

Huber, M., and **J. Trapp**, 2009: A review of NEXRAD Level II: Data, Distribution, and Applications. *Journal of Terrestrial Observation*, in press.

● FORMAL, IN PRINT:

Ashfaq, M., Y. Shi. W.-w. Tung, **R. J. Trapp**, X. Gao, J. S. Pal, and N. S. Diffenbaugh, 2009: Suppression of South Asia summer monsoon precipitation in the 21st century. *Geophysical Research Letters*, L01704, doi:10.1029/2008GL036500.

Trapp, R. J., N. S. Diffenbaugh, and A. Gluhovsky, 2009: Transient response of severe thunderstorm forcing to elevated greenhouse gas concentrations. *Geophysical Research Letters*, 36, L01703, doi:10.1029/2008GL036203.

Diffenbaugh, N.S., **R. J. Trapp**, and H. E. Brooks, 2008: Challenges in identifying influences of global warming on tornado activity. *Eos Transactions*, 89(53), 553-554.

Markowski, P., E. Rasmussen, J. Straka, R. Davies-Jones, Y. Richardson, and **J. Trapp**, 2008: Vortex lines within low-level mesocyclones obtained from pseudo-dual-Doppler radar observations. *Monthly Weather Review*, **136**, 3513-3535.

Wheatley, D. M., and **R. J. Trapp**, 2008: The effect of mesoscale heterogeneity on the genesis and structure of mesovortices within quasi-linear convective systems. *Monthly Weather Review*, **136**, 4220-4241.

Kosiba, K. A., **R. J. Trapp**, and J. Wurman, 2008: An analysis of the axisymmetric three-dimensional low level wind field in a tornado using mobile radar observations. *Geophysical Research Letters*, **35**, L05805, doi:10.1029/2007GL031851.

Trapp, R. J., N. S. Diffenbaugh, H. E. Brooks, M. E. Baldwin, E. D. Robinson, and J. S. Pal, 2007: Changes in severe thunderstorm environment frequency during the 21st century caused by anthropogenically enhanced global radiative forcing. *Proceedings, National Academy of Sciences*, **104**, 19719-19723, doi: 10.1073/pnas.0705494104.

Moore, G. E., M. Levine, J. D. Anderson, and **R. J. Trapp**, 2007: Meteorological influence on the occurrence of gastric dilatation-volvulus in military working dogs in Texas. *International Journal of Biometeorology*, doi:10.1007/s00484-007-0115-6.

Trapp, R. J., B. Halvorson, and N. S. Diffenbaugh, 2007: Telescoping, multimodel approaches to evaluate extreme convective weather under future climates, *Journal of Geophysical Research*, **112**, D20109, doi:10.1029/2006JD008345.

Schultz, D. M., K. M. Kanak, J. M. Straka, **R. J. Trapp**, B. A. Gordon, D. S. Zrnica, P. M. Kastner-Klein, C. A. Doswell III, G. H. Bryan, D. K. Lilly, and T. J. Garrett, 2006: The mysteries of mammatus clouds: Observations and formation mechanisms. *Journal of the Atmospheric Sciences*, **63**, 2409-2435.

Trapp, R. J., D. M. Wheatley, N. T. Atkins, R. W. Przybylinski, and R. Wolf, 2006: Buyer beware: Some words of caution on the use of severe wind reports in post-event assessment and research. *Weather and Forecasting*, **21**, 408-415.

Wheatley, D. M., **R. J. Trapp**, and N. T. Atkins, 2006: Radar and Damage Analysis of Severe Bow Echoes Observed during BAMEX, *Monthly Weather Review*, **134**, 791-806.

Diffenbaugh, N. S., J. S. Pal, **R. J. Trapp**, and F. Giorgi, 2005: Interactions of large- and fine-scale processes dictate the greenhouse response of extreme daily climate events over the United States. *Proceedings, National Academy of Sciences*, 102, 15774-15778.

Trapp, R. J., G. J. Stumpf, and K. L. Manross, 2005: A reassessment of the percentage of tornadic mesocyclones. *Weather and Forecasting*, **20**, 680-687.

Atkins, N. T., C. S. Bouchard, R. W. Przybylinski, **R. J. Trapp**, and G. Schmocker, 2005: Damaging surface wind mechanisms within the 10 June 2003 Saint Louis bow echo event during BAMEX. *Monthly Weather Review*, **133**, 2275–2296.

Trapp, R. J., S. A. Tessendorf, E. G. Savageau, and H. E. Brooks, 2005: Tornadoes in squall lines and bow echoes. Part I: Climatological distribution. *Weather and Forecasting*, **40**, 23-34.

Davis, C., N. Atkins, D. Bartels, L. Bosart, M. Coniglio, G. Bryan, W. Cotton, D. Dowell, B. Jewett, R. Johns, D. Jorgensen, J. Knievel, K. Knupp, W.-C. Lee, G. McFarquahar, J. Moorse, R. Przybylinski, R. Rabuer, B. Smull, **R. Trapp**, S. Trier, R. Wakimoto, M. Weisman, and C. Ziegler, 2004: The Bow Echo and MCV Experiment: Observations and Opportunities. *Bulletin of the American Meteorological Society*, **85**, 1075-1092.

Weisman, M. L., and **R. J. Trapp**, 2003: Low-level mesovortices within squall lines and bow echoes: Part I. Overview and dependence on environmental shear. *Monthly Weather Review*, **131**, 2779-2803.

Trapp, R. J., and M. L. Weisman, 2003: Low-level mesovortices within squall lines and bow echoes: Part II. Their genesis and implications. *Monthly Weather Review*, **131**, 2804-2823.

Schultz, D. M., and **R. J. Trapp**, 2003: Nonclassical cold-frontal structure caused by dry subcloud air in northern Utah during the Intermountain Precipitation Experiment (IPEX), *Monthly Weather Review*, **130**, 2222-2246.

Rust, W.D. and **R. J. Trapp**, 2002: Initial balloon soundings of the electric field in winter nimbostratus clouds in the USA, *Geophysical Research Letters*, **29**, 20-1 – 20-4.

Schultz, D. M., W. J. Steenburgh, **R. J. Trapp**, and co-authors, 2002: The Intermountain Precipitation Experiment, *Bulletin of the American Meteorological Society*, **83**, 189-210.

Trapp, R. J., N. T. Atkins, H. E. Fuelberg, J. G. LaDue, K. J. Pence, T. L. Smith, and G. J. Stumpf, 2001: Meeting Summary: 20th Conference on Severe Local Storms, *Bulletin of the American Meteorological Society*, **82**, 2251-2258.

Trapp, R. J., D. M. Schultz, A. V. Ryzhkov, and R. L. Holle, 2001: Multiscale analysis of an Oklahoma winter-precipitation event. *Monthly Weather Review*, **129**, 486-501.

Trapp, R. J., 2000: A clarification of vortex breakdown and tornadogenesis. *Monthly Weather Review*, **128**, 888-895.

Trapp, R. J. and C. A. Doswell III, 2000: Radar data objective analysis. *Journal of Atmospheric and Oceanic Technology*, **17**, 105-120.

Trapp, R. J., E. D. Mitchell, G. A. Tipton, D. A. Effertz, A. I. Watson, D. L. Andra, and M. A. Magsig, 1999: Descending and non-descending tornadic vortex signatures detected by WSR-88D's. *Weather and Forecasting*, **14**, 625-639.

Grice, G. K., **Trapp, R. J.**, S. F. Corfidi, R. Davies-Jones, C. C. Buononno, J. P. Craven, K. K. Droegemeier, C. Duchon, J. V. Houghton, R. A. Prentice, G. Romine, K. Schlachter, and K. K. Wagner, 1999: The golden anniversary celebration of the first tornado forecast, *Bulletin of the American Meteorological Society*, **80**, 1341-1348.

Trapp, R. J., 1999: Observations of nontornadic low-level mesocyclones and attendant tornadogenesis failure during VORTEX. *Monthly Weather Review*, **127**, 1693-1705.

Trapp, R. J., and R. Davies-Jones, 1997: Tornadogenesis with and without a dynamic pipe effect. *Journal of the Atmospheric Sciences*, **54**, 113-133.

Trapp, R. J. and B. H. Fiedler, 1995: Tornado-like vortexgenesis in a simplified numerical model. *Journal of the Atmospheric Sciences*, **52**, 3757-3778.

Trapp, R. J. and B. H. Fiedler, 1993: Numerical simulation of tornado-like vortices in asymmetric flow. *The Tornado: Its Structure, Dynamics, Prediction, and Hazards*. C. R. Church (Ed.), AGU Geophysical Monograph Series, Washington, 49-54.

Fiedler, B. H. and **R. J. Trapp**, 1993: A fast dynamic grid adaption scheme for meteorological flows. *Monthly Weather Review*, **121**, 2879-2888.

● BOOK CHAPTERS:

Trapp, R. J., 2002: *Severe Thunderstorms*. Encyl. Phys. Science and Technol., Academic Press, San Diego, 735-749.

Davies-Jones, R., **R. J. Trapp**, and H. B. Bluestein, 2001: Tornadoes and tornadic storms, *Severe Convective Storms, Meteorological Monograph*, No. 50, Amer. Meteor. Soc., 167-222.

PRESENTATIONS

● INVITED

Climate Change Science Workshop, Yale Forum on Climate Change and the Media, Field Museum, Chicago, Illinois, 2009: "Climate change and severe weather"

Great Lakes Meteorology Conference, Valparaiso, Indiana, 2008: "How global warming may change storm chasing by the late 21st Century"

Department of Atmospheric Science, University of Illinois, 2007: "Connections between global climate change and severe thunderstorms"

School of Meteorology, University of Oklahoma, 2007: "Severe thunderstorms and climate change"

IMO Skywarn Advanced Spotter Training Workshop, Elkhart, Indiana, 2007: "The state of the sciences of tornadoes"

Third Workshop on the Theory and Use of Regional Climate Models, Abdus Salam International Center for Theoretical Physics, Trieste, Italy, 2006: "Downscaling regional climate model data for studies of small scale severe weather phenomena"

Central Indiana Severe Weather Symposium, Indianapolis, Indiana, 2006: "Tornadoes and damaging winds within squall lines and bow echoes"

10th Severe Storms and Doppler Radar Conference of the Central Iowa NWA, Des Moines, Iowa, 2006: "A tale of two storm types" (keynote speaker)

Department of Physics, Purdue University, 2006: “Tornadoes and damaging winds within lines of thunderstorms”

Storm Prediction Center, 2005: “Radar-damage analyses and real-case simulations of damaging bow echo events during BAMEX”

National Weather Service, Springfield, Missouri, 2004: “Simulations and observations of damaging winds in squall lines and bow echoes”

Department of Atmospheric Sciences, University of Illinois, 2003: “Low-level mesovortices in squall lines and bow echoes: Vortexgenesis, and association with damaging surface winds”

Department of Physics, Miami University at Ohio, 2003: “The genesis and implications of low-level mesovortices”

Joint Meetings of the Central Illinois and Central Indiana Chapters of the AMS, 2003 (keynote speaker)

National Weather Service, Indianapolis, Indiana, 2003, “Low-level mesovortices: Vortexgenesis, effect on system structure, and association with damaging surface winds”

Department of Geological and Atmospheric Sciences, Iowa State University, 2002, “Squall line mesovortices: Genesis and subsequent vortex-induced damaging winds”

National Center for Atmospheric Research, 2002, “Low-level mesovortices: Vortexgenesis, effect on system structure, and association with damaging surface winds”

National Severe Storms Laboratory, 2001, “The formation and implications of low-level mesovortices in quasi-linear convective systems”

Department of Atmospheric Science, Texas A&M University, 2000, “Tornado development: Reconciling theory with observations”

University of Nebraska, 2000 (Crowe Lecture), “Recent tornado and winter-storm field research: Experiences and key findings”

University of Utah, 2000, “Tornadogenesis modes revealed by theory and observations”

University of Missouri, 1999, “A medley of tornado and winter storms research”

● PRESENTATIONS AT CONFERENCES, SYMPOSIA, AND WORKSHOPS:

24th AMS Conference on Severe Local Storms, Savannah, GA, 2008

4th PAN-GCSS Meeting on Advances in Modeling and Observing Clouds and Convection, Météo France, Toulouse, France, 2008

4th European Conference on Severe Storms, International Centre for Theoretical Physics, Trieste, Italy, 2007

2nd International Conference on Earth System Modeling, Max Planck Institute for Meteorology, Hamburg, Germany, 2007

Midwest Bow Echo Workshop, Louisville, KY, 2007

American Meteorological Society, *19th Conference on Climate Variability and Change*, San Antonio Texas, 2007 (contributed)

19th Conference on Climate Variability and Change / AMS Forum: Climate Change Manifested by Changes in Weather, 2007

Fifth Conference on Artificial Intelligence Applications to Environmental Science, 2007 (contributed)

23rd AMS Conference on Severe Local Storms, St. Louis, MO, 2006

11th AMS Conference on Mesoscale Processes, 2005 (contributed)

32nd AMS Conference on Radar Meteorology, 2005 (contributed)

Second Midwest Extreme and Hazardous Weather Regional Conference, 2005

Second BAMEX Workshop, 2005

22nd AMS Conference on Severe Local Storms, 2004

First BAMEX Workshop, 2004

31st AMS Conference on Radar Meteorology, 2003 (contributed)

Symposium on the F-scale and Severe Weather Damage Assessment, 2003 (contributed)

21st AMS Conference on Severe Local Storms, 2002

20th AMS Conference on Severe Local Storms, 2000

9th AMS Conference on Mountain Meteorology, 2000

VORTEX Symposium, 2000

8th AMS Conference on Mesoscale Processes, 1999

29th AMS Conference on Radar Meteorology, 1999

28th AMS Conference on Radar Meteorology, 1997

18th AMS Conference on Severe Local Storms, 1996

27th AMS Conference on Radar Meteorology, 1995

17th AMS Conference on Severe Local Storms, 1993

Third Tornado Symposium, 1991

16th AMS Conference on Severe Local Storms, 1990