

CURRICULUM VITAE

Stan Trier

PERSONAL

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EDUCATION

1997 Ph.D., Atmospheric Science, Colorado State University
1987 M.S., Meteorology, Pennsylvania State University
1984 B.S., Meteorology, Florida State University

PROFESSIONAL RECORD

12/10-present Project Scientist III, Mesoscale Dynamics Group, NCAR/MMM
6/02-12/10 Project Scientist II, Prediction Diagnostics Group, NCAR/MMM
1/99-6/02 Project Scientist I, Mesoscale Dynamics Group, NCAR/MMM
6/95-1/99 Associate Scientist III, Mesoscale Analysis Group, NCAR/MMM
6/91-5/95 Associate Scientist II, Mesoscale Prediction Section,
NCAR/MMM/ATD
1/88-5/91 Associate Scientist I, Mesoscale Prediction Section,
NCAR/MMM

PROFESSIONAL ACTIVITIES

2012-present American Meteorological Society Mesoscale Processes Committee
2005-2008 American Meteorological Society Severe Local Storms Committee
2001-2003 Bow-Echo and MCV Experiment (BAMEX) Steering
Committee
1998-2001, Associate Editor, Monthly Weather Review
2005-2007

Honors and Awards

- 2000 MMM outstanding publication and nominee for NCAR outstanding publication award
- 2002 NCAR outstanding publication award

PUBLICATIONS-Refereed

Reviewed Articles

1. **Trier, S. B.**, D. B. Parsons, and T. J. Matejka, 1990: Observations of a subtropical cold front in a region of complex terrain. *Mon. Wea. Rev.*, 118, 2449-2470.
2. **Trier, S. B.**, D. B. Parsons, and J. H. E. Clark, 1991: Environment and evolution of a cold-frontal mesoscale convective system. *Mon. Wea. Rev.*, 119, 2429-2455.
3. **Trier, S. B.** and D. B. Parsons, 1993: Evolution of environmental conditions preceding the development of a nocturnal mesoscale convective complex. *Mon. Wea. Rev.*, 121, 1078-1098.
4. **Trier, S. B.** and D. B. Parsons, 1995: Updraft dynamics within a numerically simulated subtropical rainband. *Mon. Wea. Rev.*, 123, 39-58.
5. **Trier, S. B.**, W. C. Skamarock, M. A. LeMone, D. B. Parsons, and D. P. Jorgensen, 1996: Structure and evolution of the 22 February 1993 TOGA-COARE squall line: Numerical simulations. *J. Atmos. Sci.*, 53, 2861-2886.
6. **Trier, S. B.**, W. C. Skamarock, and M. A. LeMone, 1997: Structure and evolution of the 22 February 1993 TOGA-COARE squall line: Organization mechanisms inferred from numerical simulation. *J. Atmos. Sci.*, 54, 386-407.
7. Jorgensen, D. P., M. A. LeMone, and **S. B. Trier**, 1997: Structure and evolution of the 22 February 1993 TOGA-COARE squall line: Aircraft observations of precipitation, circulation, and surface energy fluxes. *J. Atmos. Sci.*, 54, 1961-1985.
8. **Trier, S. B.**, M. A. LeMone, and W. C. Skamarock, 1998: Effect of three-dimensional structure on the stormwide horizontal accelerations and momentum budget of a simulated squall line. *Mon. Wea. Rev.*, 126, 2580-2598.
9. LeMone, M. A., E. J. Zipser, and **S. B. Trier**, 1998: The role of environmental shear and thermodynamic conditions in determining the structure and evolution of mesoscale convective systems during TOGA COARE. *J. Atmos. Sci.*, 55, 3493-3518.

10. **Trier, S. B.**, C. A. Davis, and J. Tuttle, 2000: Long-lived mesoconvective vortices and their environment. Part I: Observations from the Central United States during the 1998 warm season. *Mon. Wea. Rev.*, 128, 3376-3395.
11. **Trier, S. B.**, C. A. Davis, and W. C. Skamarock, 2000: Long-lived mesoconvective vortices and their environment. Part II: Induced thermodynamic destabilization in idealized simulations. *Mon. Wea. Rev.*, 128, 3396-3412.
12. Davis, C.A., D. A. Ahijevych, and **S. B. Trier**, 2002: Detection and prediction of warm season midtropospheric vortices by the rapid update cycle. *Mon. Wea. Rev.*, 130, 24-42.
13. **Trier, S. B.**, and C. A. Davis, 2002: Influence of balanced motions on heavy precipitation within a long lived convectively generated vortex. *Mon. Wea. Rev.*, 130, 877-899.
14. Carbone, R. E., J. D. Tuttle, D. A. Ahijevych, and **S. B. Trier**, 2002: Inferences of predictability associated with warm season precipitation episodes. *J. Atmos. Sci.*, 59, 2033-2056.
15. Davis, C. A., and **S. B. Trier**, 2002: Cloud resolving simulations of mesoscale vortex intensification and its effect on a serial mesoscale convective system. *Mon. Wea. Rev.*, 130, 2839-2858.
16. Snyder, C., T. M. Hamill, and **S. B. Trier**, 2003: Linear evolution of error covariances in a quasigeostrophic model. *Mon. Wea. Rev.*, 131, 189-205.
17. Davis, C. A., K. W. Manning, R. E. Carbone, **S. B. Trier**, and J. D. Tuttle, 2003: Coherence of warm-season continental rainfall in numerical prediction models. *Mon. Wea. Rev.*, 131, 2667-2679.
18. **Trier, S. B.**, F. Chen, and K. W. Manning, 2004: A study of convection initiation in mesoscale model using high-resolution land surface initial conditions. *Mon. Wea. Rev.*, 132, 2954-2976.
19. Davis, C. A., 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. McFarquhar, J. Moore, R. Przybylinski, R. Rauber, B. Smull, R. Trapp, **S. Trier**, R. Wakimoto, M. Weisman, and C. Ziegler, 2004: The Bow Echo and MCV experiment: Observations and opportunities. *Bull. Amer. Meteor. Soc.*, 85, 1075-1093.
20. **Trier, S. B.**, C. A. Davis, D. A. Ahijevych, M. L. Weisman, and G. H. Bryan, 2006: Mechanisms supporting long-lived episodes of propagating nocturnal convection within a 7-day WRF model simulation. *J. Atmos. Sci.*, **63**, 2437-2461.
21. Chen, F., K. W. Manning, M. A. LeMone, **S. B. Trier**, J. G. Alfieri, R. Roberts, J. Wilson, M. Tewari, D. Niyogi, T. W. Horst, S. P. Oncley, J. Basara, and P. Blanken, 2007: Evaluation

- of the characteristics of the NCAR high-resolution land data assimilation system. *J. Appl. Meteor. Climatol.*, **46**, 694-713.
22. Davis, C. A., and **S. B. Trier**, 2007: Mesoscale convective vortices observed during BAMEX. Part I: Kinematic and thermodynamic structure. *Mon. Wea. Rev.*, **135**, 2029-2049.
 23. **Trier, S. B.**, and C. A. Davis, 2007: Mesoscale convective vortices observed during BAMEX. Part II: Influences on secondary deep convection. *Mon. Wea. Rev.*, **135**, 2051-2075.
 24. **Trier, S. B.**, F. Chen, K. W. Manning, M. A. LeMone, and C. A. Davis, 2008: Sensitivity of the PBL and precipitation in 12-day simulations of warm-season convection using different land surface models and soil wetness conditions. *Mon. Wea. Rev.*, **136**, 2321-2343.
 25. **Trier, S. B.** and R. D. Sharman, 2009: Convection-permitting simulations of the environment supporting widespread turbulence within the upper-level outflow of a mesoscale convective system. *Mon. Wea. Rev.*, **137**, 1972-1990.
 26. **Trier, S. B.**, C. A. Davis, and D. A. Ahijevych, 2010: Environmental controls on the diurnal cycle of warm-season precipitation in the continental United States. *J. Atmos. Sci.*, **67**, 1066-1090.
 27. **Trier, S. B.**, R. D. Sharman, R. G. Fovell, and R. G. Frehlich, 2010: Numerical simulation of radial cloud bands within the upper-level outflow of an observed mesoscale convective system. *J. Atmos. Sci.*, **67**, 2990-2999.
 28. Marsham, J. H., **S. B. Trier**, T. M. Weckwerth, and J. W. Wilson, 2011: Observations of elevated convection initiation leading to a surface-based squall line during 13 June IHOP_2002. *Mon. Wea. Rev.*, **139**, 247-271.
 29. **Trier, S. B.**, M. A. LeMone, F. Chen, and K. W. Manning, 2011: Effects of surface heat and moisture exchange on ARW-WRF model warm-season precipitation forecasts over the central United States. *Wea. Forecasting*, **26**, 3-25.
 30. **Trier, S. B.**, J. H. Marsham, C. A. Davis, and D. A. Ahijevych, 2011: Numerical simulations of the post-sunrise reorganization of a nocturnal mesoscale convective system during 13 June IHOP_2002. *J. Atmos. Sci.*, **68**, 2988-3011.
 31. Lane, T. P., R. D. Sharman, **S. B. Trier**, R. G. Fovell, and J. K. Williams, 2012: Recent advances in the understanding of near-cloud turbulence. *Bull. Amer. Meteor. Soc.*, **93**, 499-515.
 32. Sharman, R. D., **S. B. Trier**, T. P. Lane, and J. D. Doyle, 2012: Sources and dynamics of turbulence in the upper troposphere and lower stratosphere: A review. *Geophys. Res. Lett.*, **39**, L12803, doi:10.1029/2012GL051996.

33. **Trier, S. B.**, R. D. Sharman, and T. P. Lane, 2012: Impacts of moist convection on a cold-season outbreak of the clear-air turbulence (CAT). *Mon. Wea. Rev.*, **140**, 2477-2496.
34. Sun, J., Q. Xiao, **S. B. Trier**, M. L. Weisman, H. Wang, Z. Ying, M. Xu, and Y. Zhang, 2012: Sensitivity of 0-12 hour warm-season precipitation forecasts over the central United States to model initialization and parameterizations. *Wea. Forecasting*, **27**, 832-855.
35. Laing, A. G., **S. B. Trier**, and C. A. Davis, 2012: Numerical simulation of episodes of organized convection in tropical northern Africa. *Mon. Wea. Rev.*, **140**, 2874-2886.
36. **Trier, S. B.**, C. A. Davis, D. A. Ahijevych, and K. W. Manning, 2014: Use of the parcel buoyancy minimum (B_{\min}) to diagnose simulated thermodynamic destabilization. Part I: Methodology and case studies of MCS initiation environments. *Mon. Wea. Rev.*, **142**, 945-966.
37. **Trier, S. B.**, C. A. Davis, D. A. Ahijevych, and K. W. Manning, 2014: Use of the parcel buoyancy minimum (B_{\min}) to diagnose simulated thermodynamic destabilization. Part II: Composite analysis of mature MCS environments. *Mon. Wea. Rev.*, **142**, 967-990.
38. Kim, J.-H., H.-Y. Chun, R. D. Sharman, and **S. B. Trier**, 2014: The role of vertical shear on aviation turbulence within cirrus bands of a simulated western Pacific cyclone. *Mon. Wea. Rev.*, **142**, 2794-2813.
39. **Trier, S. B.**, C. A. Davis, and R. E. Carbone, 2014: Mechanisms governing the persistence and diurnal cycle of a heavy rainfall corridor. *J. Atmos. Sci.*, **71**, 4102-4126, doi: 10.1175/JAS-D014-0134.1.
40. Keller, T. L., **S. B. Trier**, W. D. Hall, R. D. Sharman, M. Xu, and Y. Liu, 2015: Lee waves associated with a commercial jetliner accident at Denver International Airport. *J. Appl. Meteor. Climatol.*, **54**, 1373-1392.
41. **Trier, S. B.**, G. S. Romine, D. A. Ahijevych, R. J. Trapp, R. S. Schumacher, M. C. Coniglio, and D. J. Stensrud, 2015: Mesoscale thermodynamic influences on convection initiation near a surface dryline in a convection-permitting ensemble. *Mon. Wea. Rev.*, **143**, 3276-3753.
42. Weisman, M. L., R. J. Trapp, G. S. Romine, C. Davis, R. Torn, M. Baldwin, L. Bosart, J. Brown, M. Coniglio, D. Dowell, A. C. Evans, T. J. Galarneau, Jr., J. Haggerty, T. Hock, K. Manning, P. Roebber, P. Romashkin, R. Schumacher, C. S. Schwartz, R. Sobash, D. Stensrud, and **S. B. Trier**, 2015: The Mesoscale Predictability Experiment (MPEX), *Bull. Amer. Meteor. Soc.*, doi:10.1175/BAMS-D-13-00281.1, in press.
43. Schwartz, C. S., G. S. Romine, M. L. Weisman, R. A. Sobash, K. R. Fossell, K. W. Manning, and **S. B. Trier**, 2015: A real-time convection-allowing ensemble prediction system initialized by mesoscale ensemble Kalman filter analyses. *Wea. Forecasting*, in press.

Book Chapters

Trier, S. B., 2003: Convective Storms: Convection Initiation. *Encyclopedia of Atmospheric Sciences*, Academic Press, 560-570.

Trier, S. B., 2015: Modeling Studies of Turbulence Mechanisms Associated with Mesoscale Convective Systems. Chapter 17, *Aviation Turbulence: Processes, Detection, and Prediction*, R. D. Sharman and T. P. Lane, eds., Springer.

PUBLICATIONS-nonrefereed

Reports and other Publications

Parsons, D. B. and S. B. Trier, 1989: Taiwan Area Mesoscale Experiment: Doppler Radar Operations Summary. NCAR/TN-315+STR, *NCAR Tech. Note*, National Center for

Trier, S. B., 1990: Taiwan Area Mesoscale Experiment: A Guide to Precipitation Patterns during the 1987 Field Phase. NCAR/TN-350+STR, *NCAR Tech. Note*, National Center

Trier, S.B., 1997: Multiscale analysis of a simulated oceanic mesoscale convective system and its environmental impact. NCAR/CT-162. NCAR Cooperative Thesis, National Center for Atmospheric Research, Boulder, CO.

Ahijevych, D. A., R. E. Carbone, J. D. Tuttle, and S. B. Trier, 2001: Radar Data and Climatological Statistics Associated with Warm Season Episodes Over the Continental United States. NCAR/TN-448+STR, *NCAR Tech. Note*, National Center for Atmospheric Research, Boulder, CO, 81 pp.

Mueller, C., S. Trier, D. Megenhardt, D. Ahijevych, N. Rehak, and G. Cuning, 2004: Description of the National Convective Weather Forecast (NCWF-2). Report to the Federal Aviation Administration.

Lane, T. P., R. D. Sharman, and S. B. Trier, 2010: Rising above the storm: Studies into convectively induced turbulence. *Meteorology Technology International*, 116-119.

Blackburn G., J. Craig, F. McDonough, G. Meymaris, J. Pearson, R. Sharman, S. Trier, J. Williams, 2012: Upper Troposphere/Lower Stratosphere (UTLS) Research Project: Case Study Analysis of Selected Events – Final Report. Federal Aviation Administration, Aviation Weather Division. FAA Contract DTFAWA-10-D-00028.

RECENT INVITED SEMINARS AND LECTURES

April 2005 *MCVs and the Convective Forecast Problem*. Invited lecture at the St. Louis Chapter of the American Meteorological Society Spring Meeting. St. Louis, MO.

- July 2006 *Convection Initiation (Some Theory and Fundamentals)*. Invited lecture at The NCAR Summer Colloquium (The Challenge of Convective Forecasting). Boulder, CO.
- July 2006 *Life Cycle of Warm-Season Midlatitude Convection*. Invited lecture at The NCAR Summer Colloquium (The Challenge of Convective Forecasting). Boulder, CO.
- April 2007 *Mesoscale Convective Vortices Observed during BAMEX*. Invited seminar, National Severe Storms Laboratory, Norman, OK.
- May 2008 *Using Large-Domain Convection Resolving Simulations to better understand the Diurnal Cycle of Summer Rainfall*. Invited lecture for Prof. William Cotton's graduate course in cloud dynamics (AT 712) at Colorado State University, Fort Collins, CO.
- June 2008 *Mesoscale Convective Vortices (MCVs) observed during BAMEX 2003*. Invited seminar, Taiwan Central Weather Bureau, Taipei, Taiwan.
- April 2012 *Influences of Organized Convection on Clear-Air Turbulence*. Invited lecture for Prof. Richard Johnson's graduate course in mesoscale dynamics (AT 735) at Colorado State University. Fort Collins, CO.

GRANTS AND PROPOSALS

Davis, C. A. (PI), W. C. Skamarock (Co-I), S. B. Trier (Co-I), and R. H. Johnson (Collaborator), NASA Grant "Mesoscale convective vortices as precursors of organized, heavy precipitation," 2/1/98 – 4/30/01.

Carbone, R. (PI), C. Davis (Co-PI), M. Moncrieff (Co-PI), S. Trier (Co-PI), D. Ahijevych (Co-I), C. Liu (Co-I), L. J. Miller (Co-I), and J. Tuttle (Co-I), "Predictability and Prediction of Heavy Warm-Season Rainfall," 7/1/01 – 9/30/03. USWRP.

Chen, F. (PI), E. Brandes (Co-PI), J. Coen (Co-PI), M. LeMone (Co-PI), L. Mearns (Co-PI), D. Parsons (Co-PI), S. Trier (Co-PI), T. Warner (Co-PI), M. Xu (Co-PI), and D. Yates (Co-PI), "Land Surface/Atmosphere Interactions and its Relationship to Improving Quantitative Precipitation Forecasting of Deep Convection in the Southern Great Plains," 7/1/01 – 9/30/03. USWRP.

Moncrieff, M. (PI), R. Carbone (Co-PI), C. Davis (Co-PI), C. Liu (Co-I), and S. Trier (Co-I), "Organized Convective Precipitation over the US Continent and Applications to Stochastic Hydrology," 3/15/03 – 3/15/06. NSF Global Energy and Water Cycle Experiment.

Chen, F. (PI), D. Gochis (Co-PI), M. LeMone (Co-PI), K. Manning (Co-PI), S. Trier (Co-PI), D. Yates (Co-PI), R. Wakimoto (Collaborator), and D. Niyogi (Collaborator), "Land-

Surface/Atmosphere Interactions and their Impacts on the Quantitative Precipitation Forecasting in the Southern Great Plains, “10/1/03 – 10/1/06. USWRP

Chen, F. (PI), M. A. LeMone (Co-I), and S. B. Trier (Co-I), “Atmospheric Responses to Land-Surface Forcing and their Impact on Precipitation Processes in the Southern Great Plains. NASA, 3/1/07 - 2/28/10.

Trier, S. B. (PI), and C. A. Davis (Co-PI), D. A. Ahijevych, and J. D. Tuttle, “Contribution of Mesoscale Processes Above the PBL on Lifecycles of Deep Convection”, NCAR STEP/USWRP Science Program. 10/1/07 – 9/30/09.

Chen, F (PI), M. LeMone, S. Trier, M. Barlage, and K. Manning, “Impacts of Land/PBL Interactions on Short-term Prediction of Precipitation: A Focused Study over the IHOP_2002 Region. NCAR STEP/USWRP Science Program. 10/1/07 – 9/30/09.

Trier, S. B. (PI), and D. A. Ahijevych, “A Process Study of Transitions between Surface-Based and Elevated Convection during IHOP and BAMEX”, NCAR STEP/USWRP Science Program. 10/1/09-9/30/12.

Chen, F., M. A. LeMone, S. B., Trier, K. W. Manning, and S.-L. Kang, “Impacts of Land-Surface Exchange Processes on Surface and Elevated Convection: A Contrasting Study of IHOP_2002 and BAMEX_2003”. NCAR STEP/USWRP Science Program. 10/1/09-9/30/12.

Trier, S. (PI), C. Davis (CO-I), and D. Ahijevych (CO-I), “Thermodynamic Mechanisms Responsible for Initiating Deep Convection in Convection-Permitting Simulations with ARW-WRF”. NCAR STEP/USWRP Science Program. 10/1/12-present.