

PAUL M. MARKOWSKI

Department of Meteorology
Pennsylvania State University
503 Walker Building
University Park, PA 16802

phone: (814) 865-0478
fax: (814) 865-3663
e-mail: pmarkowski@psu.edu

Professional Appointments

July, 2007–present Associate Professor, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania

July, 2009–October, 2009 Visiting Scientist (sabbatical leave), Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

January, 2001–July, 2007 Assistant Professor, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania

Education

Ph.D., 2000, University of Oklahoma (Meteorology; Dissertation: “Surface Thermodynamic Characteristics of Hook Echoes and Rear-Flank Downdrafts, with Implications for Tornado Genesis and Maintenance”)

M.S., 1997, University of Oklahoma (Meteorology; Thesis: “Tornadic Supercell Interactions with Boundaries during VORTEX, with Implications for Anticipating Low-Level Mesocyclogenesis”)

B.S., 1996 (magna cum laude with honors), Pennsylvania State University (Meteorology; Honors Thesis: “The Meteorological Aspects of the 27 July 1994 Mid-Atlantic Tornado Outbreak”)

Refereed Publications

† indicates students or research associates mentored by Paul Markowski

Oberthaler, A. J.[†], and P. M. Markowski, 2012: A numerical simulation study of the effects of cloud shading on quasilinear convective systems. Submitted to *Journal of the Atmospheric Sciences*.

Frame, J. W.[†], and P. M. Markowski, 2012: The dynamical influences of anvil shading on simulated supercell thunderstorms. Submitted to *Monthly Weather Review*.

Davies-Jones, R., and P. M. Markowski, 2012: Lifting of ambient air by density currents in sheared environments. Submitted to *Journal of the Atmospheric Sciences*.

- Markowski, P., Y. Richardson, J. Marquis, J. Wurman, K. Kosiba, P. Robinson, D. Dowell, E. Rasmussen, and R. Davies-Jones, 2012: The pretornadic phase of the Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2. Part I: Evolution of kinematic and surface thermodynamic fields. *Monthly Weather Review*, **140**, in press.
- Markowski, P., Y. Richardson, J. Marquis, R. Davies-Jones, J. Wurman, K. Kosiba, P. Robinson, E. Rasmussen, and D. Dowell, 2012: The pretornadic phase of the Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2. Part II: Intensification of low-level rotation. *Monthly Weather Review*, **140**, in press.
- Wurman, J., D. Dowell, Y. Richardson, P. Markowski, E. Rasmussen, D. Burgess, L. Wicker, and H. Bluestein, 2012: Verification of the Origins of Rotation in Tornadoes Experiment 2: VORTEX2. *Bulletin of the American Meteorological Society*, **93**, in press.
- Kosiba, K., J. Wurman, Y. Richardson, P. Markowski, P. Robinson, and J. Marquis, 2012: The genesis of the Goshen County, Wyoming, tornado (5 June 2009). *Monthly Weather Review*, accepted pending revisions.
- Meng, Z., F. Zhang, P. Markowski, D. Wu, and K. Zhao, 2012: A modeling study on the development of a bowing structure and associated rear inflow within a squall line over South China. *Journal of the Atmospheric Sciences*, **69**, 1182–1207.
- Marquis, J., Y. Richardson, P. Markowski, D. Dowell, and J. Wurman, 2012: The maintenance of tornadoes observed with high-resolution mobile Doppler radars. *Monthly Weather Review*, **140**, 3–27.
- Green, B., F. Zhang, and P. Markowski, 2011: Miniature supercells in the landfalling outer rainbands of Hurricane Katrina (2005). *Weather and Forecasting*, **26**, 828–847.
- Nowotarski, C. J.[†], P. M. Markowski, and Y. P. Richardson, 2011: The characteristics of numerically simulated supercell storms situated over statically stable boundary layers. *Monthly Weather Review*, **139**, 3139–3162.
- Markowski, P. M., and N. Dotzek, 2011: A numerical study of the effects of orography on supercells. *Atmospheric Research*, **100**, 457–478.
- Markowski, P. M., M. Majcen[†], Y. P. Richardson, J. Marquis, and J. Wurman, 2011: Characteristics of the wind field in three nontornadic low-level mesocyclones observed by the Doppler On Wheels radars. *E. Journal of Severe Storms Meteor.*, **6** (3), 1–48.
- Wurman, J., K. Kosiba, P. Markowski, Y. Richardson, and D. Dowell, 2010: Finescale single- and dual-Doppler analysis of tornado intensification, maintenance, and dissipation in the Orleans, Nebraska, tornadic supercell. *Monthly Weather Review*, **138**, 4439–4455.
- Frame, J.[†], and P. Markowski, 2010: Numerical simulations of radiative cooling beneath the anvils of supercell thunderstorms. *Monthly Weather Review*, **138**, 3024–3047.
- Markowski, P. M., and N. Dotzek, 2010: Comments on “Proposed Conceptual Taxonomy for Proper Identification and Classification of Tornado Events.” *Weather and Forecasting*, **25**, 338–340.
- James, R. P.[†], and P. M. Markowski, 2010: A numerical investigation of the effects of dry air aloft on deep convection. *Monthly Weather Review*, **138**, 140–161.

- Byko, Z.[†], P. Markowski, Y. Richardson, J. Wurman, and E. Adlerman, 2009: Descending reflectivity cores in supercell thunderstorms observed by mobile radars and in a high-resolution numerical simulation. *Weather and Forecasting*, **24**, 155–186.
- Markowski, P. M., and Y. P. Richardson, 2009: Tornadogenesis: Our current understanding, forecasting considerations, and questions to guide future research. *Atmospheric Research*, **93**, 3–10.
- Frame, J.[†], J. L. Petters, P. Markowski, and J. Harrington, 2009: An application of the tilted pixel approximation to cumulonimbus environments. *Atmospheric Research*, **91**, 127–136.
- Frame, J.[†], P. Markowski, Y. Richardson, J. Straka, and J. Wurman, 2009: Polarimetric and dual-Doppler radar observations of the Lipscomb County, Texas, supercell thunderstorm on 23 May 2002. *Monthly Weather Review*, **137**, 544–561.
- Marquis, J. M., Y. Richardson, J. Wurman, and P. M. Markowski, 2008: Single- and dual-Doppler analysis of a tornadic vortex and surrounding storm-scale flow in the Crowell, TX, supercell of 30 April 2000. *Monthly Weather Review*, **136**, 5017–5043.
- Majcen, M.[†], P. Markowski, Y. Richardson, D. Dowell, and J. Wurman, 2008: Multi-pass objective analyses of radar data. *Journal of Atmospheric and Oceanic Technology*, **25**, 1845–1858.
- Markowski, P. M., J. M. Straka, E. N. Rasmussen, R. P. 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.
- Richardson, Y., P. Markowski, J. Verlinde, and J. Wurman, 2008: Integrating classroom learning and research: The Pennsylvania Area Mobile Radar Experiment (PAMREX). *Bulletin of the American Meteorological Society*, **89**, 1097–1101.
- Markowski, P. M., 2008: A comparison of the midlevel kinematic characteristics of a pair of supercell thunderstorms observed by airborne Doppler radar. *Atmospheric Research*, **88**, 314–322.
- Straka, J. M., E. N. Rasmussen, R. P. Davies-Jones, and P. M. Markowski, 2007: An observational and idealized numerical examination of low-level counter-rotating vortices toward the rear flank of supercells. *Electronic Journal of Severe Storms Meteorology*, **2(8)**, 1–22.
- Markowski, P. M., and J. R. Stonitsch[†], 2007: Reply to “Comments on Unusually long-duration, dual-Doppler radar observations of a front in a convective boundary layer.” *Monthly Weather Review*, **135**, 4240–4246.
- Stonitsch[†], J. R., and P. M. Markowski, 2007: Unusually long-duration, dual-Doppler radar observations of a front in a convective boundary layer. *Monthly Weather Review*, **135**, 93–117.
- Markowski, P. M., and Y. Richardson, 2007: Observations of vertical wind shear heterogeneity in convective boundary layers. *Monthly Weather Review*, **135**, 843–861.
- Frame, J. W.[†], and P. M. Markowski, 2006: Interactions between simulated squall lines and idealized terrain. *Monthly Weather Review*, **134**, 1919–1941.
- Shabbott, C. J.[†], and P. M. Markowski, 2006: Surface in situ observations within the outflow of forward-flank downdrafts of supercell thunderstorms. *Monthly Weather Review*, **134**, 1422–1441.

- James, R. P.[†], P. M. Markowski, and J. M. Fritsch, 2006: Bow echo sensitivity to low-level moisture. *Monthly Weather Review*, **134**, 950–964.
- Markowski, P. M., and Y. Richardson, 2006: On the classification of vertical wind shear as directional shear versus speed shear. *Weather and Forecasting*, **21**, 242–247.
- Markowski, P. M., C. Hannon[†], and E. Rasmussen, 2006: Observations of convection initiation “failure” from the 12 June 2002 IHOP deployment. *Monthly Weather Review*, **134**, 375–405.
- Markowski, P. M., and C. Hannon[†], 2006: Multiple-Doppler radar observations of the evolution of vorticity extrema in a convective boundary layer. *Monthly Weather Review*, **134**, 355–374.
- Markowski, P. M., and J. Harrington, 2005: A simulation of a supercell thunderstorm with emulated radiative cooling beneath the anvil. *Journal of the Atmospheric Sciences*, **62**, 2607–2617.
- James, R. P.[†], J. M. Fritsch, and P. M. Markowski, 2005: Environmental distinctions between cellular and slabular convective lines. *Monthly Weather Review*, **133**, 2669–2691.
- Hoch, J.[†], and P. M. Markowski, 2005: A climatology of springtime dryline position in the U.S. Great Plains region. *Journal of Climate*, **18**, 2132–2137.
- Doswell, C. A., III, and P. M. Markowski, 2004: Is buoyancy a relative quantity? *Monthly Weather Review*, **132**, 853–863.
- Markowski, P. M., C. Hannon[†], J. Frame[†], E. Lancaster[†], A. Pietrycha[†], R. Edwards, and R. Thompson, 2003: Characteristics of vertical wind profiles near supercells obtained from the Rapid Update Cycle. *Weather and Forecasting*, **18**, 1262–1272.
- Thompson, R., R. Edwards, J. Hart, K. Elmore, and P. Markowski, 2003: Close proximity soundings within supercell environments obtained from the Rapid Update Cycle. *Weather and Forecasting*, **18**, 1243–1261.
- Markowski, P. M., 2003: Comments on “Use of a mesoscale model to forecast severe weather associated with a cold front aloft.” *Weather and Forecasting*, **18**, 384–388.
- Markowski, P. M., J. M. Straka, and E. N. Rasmussen, 2003: Tornadogenesis resulting from the transport of circulation by a downdraft: Idealized numerical simulations. *Journal of the Atmospheric Sciences*, **60**, 795–823.
- Markowski, P. M., J. M. Straka, and E. N. Rasmussen, 2002: Direct surface thermodynamic observations within the rear-flank downdrafts of nontornadic and tornadic supercells. *Monthly Weather Review*, **130**, 1692–1721.
- Markowski, P. M., 2002: Hook echoes and rear-flank downdrafts: A review. *Monthly Weather Review*, **130**, 852–876.
- Markowski, P. M., 2002: Summary of mobile mesonet observations on 3 May 1999. *Weather and Forecasting*, **17**, 430–444.
- Markowski, P. M., and J. M. Straka, 2000: Some observations of rotating updrafts in a low-buoyancy, highly-sheared environment. *Monthly Weather Review*, **127**, 449–461.
- Rasmussen, E. N., S. J. Richardson, J. M. Straka, P. M. Markowski, and D. O. Blanchard, 2000: The association of significant tornadoes with a baroclinic boundary on 2 June 1995. *Monthly Weather Review*, **127**, 174–191.

- Shapiro, A., and P. M. Markowski, 1999: Dynamics of elevated vortices. *Journal of the Atmospheric Sciences*, **56**, 1101–1122.
- Markowski, P. M., E. N. Rasmussen, and J. M. Straka, 1998: Observations of low-level baroclinity generated by anvil shadows. *Monthly Weather Review*, **126**, 2942–2958.
- Markowski, P. M., J. M. Straka, E. N. Rasmussen, and D. O. Blanchard, 1998: Variability of storm-relative helicity during VORTEX. *Monthly Weather Review*, **126**, 2959–2971.
- Markowski, P. M., E. N. Rasmussen, and J. M. Straka, 1998: The occurrence of tornadoes in supercells interacting with boundaries during VORTEX-95. *Weather and Forecasting*, **13**, 852–859.
- Markowski, P. M., and D. J. Stensrud, 1998: Mean monthly diurnal cycles observed with PRE-STORM surface data. *Journal of Climate*, **11**, 2995–3009.

Extended Abstracts

- Markowski, P., Y. Richardson, J. Wurman, K. Kosiba, P. Robinson, J. Marquis[†], D. Dowell, E. Rasmussen, and R. Davies-Jones, 2011: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase. Preprints, *6th European Conference on Severe Storms*, Palma de Mallorca, Spain.
- Markowski, P., Y. Richardson, J. Wurman, K. Kosiba, P. Robinson, E. Rasmussen, D. Dowell, E. Rasmussen, R. Davies-Jones, and J. Marquis[†], 2011: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase. Preprints, *35th Conference on Radar Meteorology*, Pittsburgh, Pennsylvania, Amer. Meteor. Soc.
- Marquis, J.[†], Y. Richardson, P. Markowski, D. Dowell, J. M. Wurman, K. Kosiba, and P. Robinson, 2010: Preliminary analysis of the Goshen County tornadic supercell on 5 June 2009 during VORTEX2 using EnKF assimilation of mobile radar and mesonet data. Preprints, *35th Conference on Radar Meteorology*, Pittsburgh, Pennsylvania, Amer. Meteor. Soc.
- Meng, Z., F. Zhang, P. Markowski, D. Wu, and K. Zhao, 2011: Mechanisms for the formation of rear inflow and a bow echo within the 23 April 2007 squall line over South China. Preprints, *14th Conference on Mesoscale Processes*, Los Angeles, California, Amer. Meteor. Soc.
- Marquis, J.[†], Y. Richardson, P. Markowski, D. Dowell, J. M. Wurman, K. Kosiba, and P. Robinson, 2010: Preliminary analysis of the Goshen County tornadic supercell on 5 June 2009 during VORTEX2 using EnKF assimilation of mobile radar and mesonet data. Preprints, *14th Conference on Mesoscale Processes*, Los Angeles, California, Amer. Meteor. Soc.
- Markowski, P., Y. Richardson, J. Wurman, K. Kosiba, P. Robinson, E. Rasmussen, D. Dowell, E. Rasmussen, R. Davies-Jones, and J. Marquis[†], 2011: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase. Preprints, *14th Conference on Mesoscale Processes*, Los Angeles, California, Amer. Meteor. Soc.
- Nowotarski, C.[†], P. Markowski, Y. Richardson, and G. Bryan, 2011: Interactions between simulated supercell thunderstorms and dry boundary layer convection. Preprints, *14th Conference on Mesoscale Processes*, Los Angeles, California, Amer. Meteor. Soc.
- Markowski, P., M. Majcen[†], and Y. Richardson, 2010: Near-surface vortexgenesis in idealized three-dimensional numerical simulations involving a heat source and a heat sink in a vertically

- sheared environment. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Ziegler, C. L., M. I. Biggerstaff, L. J. Wicker, D. W. Burgess, E. R. Mansell, C. M. Schwarz, P. Markowski, Y. P. Richardson, and C. C. Weiss, 2010: Storm structure and decay process of the 9 June, 2009 Greensburg, KS supercell during VORTEX2. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Markowski, P., Y. Richardson, J. Wurman, K. Kosiba, P. Robinson, and J. Marquis[†], 2010: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Kosiba, K., J. Wurman, Y. Richardson, P. Markowski, D. C. Dowell, P. Robinson, and J. Marquis[†], 2010: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Tornadogenesis phase. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Kosiba, K., J. Wurman, Y. Richardson, P. Markowski, D. C. Dowell, P. Robinson, and J. Marquis[†], 2010: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Tornado intensification phase. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Richardson, Y., P. Markowski, J. Wurman, K. Kosiba, and J. Marquis[†], 2010: The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Tornado dissipation phase. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Marquis, J.[†], Y. Richardson, P. Markowski, D. Dowell, J. M. Wurman, K. Kosiba, and P. Robinson, 2010: Preliminary analysis of the Goshen County tornadic supercell on 5 June 2009 during VORTEX2 using EnKF assimilation of mobile radar and mesonet data. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Wurman, J., L. J. Wicker, Y. P. Richardson, E. N. Rasmussen, P. M. Markowski, D. Dowell, D. W. Burgess, and H. B. Bluestein, 2010: An overview of the VORTEX2 field campaign. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Hastings, R., Y. Richardson, P. Markowski, and J. Wurman, 2010: Storm mergers. Part 2: Observations of merger events from VORTEX2. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Skinner, P., C. Weiss, Y. Richardson, and P. Markowski, 2010: Intercomparison between mobile and stationary surface observing platforms in VORTEX2. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Richardson, Y., P. Markowski, S. Waugh, and S. Fredrickson, 2010: Mobile mesonet observations during VORTEX2. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Nowotarski, C.[†], P. Markowski, Y. Richardson, and G. Bryan, 2010: Simulating supercell thunderstorms in a horizontally heterogeneous convective boundary layer. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Oberthaler, A.[†], and P. Markowski, 2010: Simulated squall lines with and without cloud shading

- effects. Preprints, *25th Conference on Severe Local Storms*, Denver, Colorado, Amer. Meteor. Soc.
- Markowski, P., and N. Dotzek, 2009: Numerical simulations of supercells over idealized orography. Preprints, *5th European Conference on Severe Storms*, Landshut, Germany.
- Bluestein, H., D. Burgess, D. Dowell, P. Markowski, E. Rasmussen, Y. Richardson, L. Wicker, and J. Wurman, 2009: VORTEX2: The Second Verification of the Origins of Rotation in Tornadoes Experiment. Preprints, *5th European Conference on Severe Storms*, Landshut, Germany.
- Kosiba, K., J. Wurman, Y. Richardson, and P. Markowski, 2009: Mesocyclone-scale mobile radar observations in VORTEX2. Preprints, *5th European Conference on Severe Storms*, Landshut, Germany.
- Richardson, Y., P. Markowski, J. Wurman, and K. Kosiba, 2009: Mobile mesonet observations in VORTEX2. Preprints, *5th European Conference on Severe Storms*, Landshut, Germany.
- Frame, J.[†], P. Markowski, and J. Petters, 2008: The dynamical influences of cloud shading on simulated supercell thunderstorms. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- James, R.[†], and P. Markowski, 2008: A numerical investigation of the effects of dry air aloft on quasi-linear convective systems. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Knopfmeier, K.[†], P. Markowski, and Y. Richardson, 2008: Numerical simulations of supercells in convective boundary layers. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Majcen, M.[†], P. Markowski, Y. Richardson, and J. Wurman, 2008: Dual-Doppler analyses of nontornadic supercells observed with mobile ground-based Doppler radars. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Markowski, P., and Y. Richardson, 2008: The structure and evolution of vortex lines in supercell thunderstorms. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Marquis, J., Y. Richardson, J. Wurman, P. Markowski, and D. Dowell, 2008: Mobile radar observations of tornadic supercells with multiple rear-flank gust fronts. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Nowotarski, C.[†], and P. Markowski, 2008: The effects of varying low-level, environmental stability on low-level rotation in numerical simulations of elevated supercells. Preprints, *24th Conference on Severe Local Storms*, Savannah, Georgia, Amer. Meteor. Soc.
- Markowski, P., 2007: Tornadogenesis: Our current understanding, operational considerations, and questions to guide future research. Preprints, *4th European Conference on Severe Storms*, Trieste, Italy.
- Majcen, M.[†], P. Markowski, Y. Richardson, D. Dowell, and J. Wurman, 2007: Multi-pass objective analyses of radar data: Preliminary results. Preprints, *33rd Conf. on Radar Meteorology*, Cairns, Australia, Amer. Meteor. Soc.
- Frame, J.[†], and P. Markowski, 2006: Simulations of a supercell thunderstorm with radiative transfer, surface physics, and a soil model. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis,

MO, Amer. Meteor. Soc.

Marquis, J., Y. Richardson, P. Markowski, J. Wurman, and D. Dowell, 2006: The maintenance of tornadoes observed with high-resolution mobile Doppler radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Majcen, M.[†], P. Markowski, Y. Richardson, and J. Wurman, 2006: A dual-Doppler analysis of a nontornadic supercell observed on 12 June 2004 using ground-based mobile radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Byko, Z.[†], Y. Richardson, P. Markowski, and J. Wurman, 2006: Radar reflectivity “blobs” observed by the Doppler On Wheels. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Frame, J.[†], P. Markowski, Y. Richardson, and J. Wurman, 2006: Multiple-Doppler observations of a nontornadic supercell on 23 May 2002 using ground-based mobile radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Markowski, P., 2006: Some potentially interesting differences in the midlevel kinematic characteristics of a nontornadic and tornadic supercell observed by ELDORA during VORTEX. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Frame, J.[†], P. Markowski, Y. Richardson, and J. Wurman, 2006: Multiple-Doppler observations of a nontornadic supercell on 23 May 2002 using ground-based mobile radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Frame, J.[†], and P. Markowski, 2006: Simulations of a supercell thunderstorm with radiative transfer, surface physics, and a soil model. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Marquis, J., Y. Richardson, P. Markowski, J. Wurman, and D. Dowell, 2006: The maintenance of tornadoes observed with high-resolution mobile Doppler radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Majcen, M.[†], P. Markowski, Y. Richardson, and J. Wurman, 2006: A dual-Doppler analysis of a nontornadic supercell observed on 12 June 2004 using ground-based mobile radars. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Byko, Z.[†], Y. Richardson, P. Markowski, and J. Wurman, 2006: Radar reflectivity “blobs” observed by the Doppler On Wheels. Preprints, *23rd Conf. on Severe Local Storms*, St. Louis, MO, Amer. Meteor. Soc.

Markowski, P. M., and J. Y. Harrington, 2004: Sensitivity of a simulated supercell to emulated radiative cooling beneath the anvil. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.

Markowski, P. M., and Y. P. Richardson, 2004: Multiple-Doppler radar observations of vertical wind profile heterogeneity in convective boundary layers. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.

Markowski, P. M., and C. Hannon[†], 2004: Multiple-Doppler radar observations of the structure and evolution of vortices in a convective boundary layer. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.

- Frame, J.[†], and P. Markowski, 2004: The interaction of simulated squall lines with idealized terrain. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.
- Shabbott, C.[†], and P. Markowski, 2004: Surface observations in the forward-flank downdraft of a tornadic and nontornadic supercell. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.
- Stonitsch, J.[†], and P. Markowski, 2004: Evolution of boundary layer wind and moisture fields along a front during IHOP. Preprints, *22nd Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc.
- Markowski, P. M., C. Hannon[†], J. Frame[†], E. Lancaster[†], A. Pietrycha[†], R. Edwards, and R. Thompson, 2002: Characteristics of RUC vertical wind profiles near supercells. Preprints, *21st Conf. on Severe Local Storms*, San Antonio, TX, Amer. Meteor. Soc., 599–602.
- Hannon, C.[†], and P. M. Markowski, 2003: A multi-Doppler radar analysis of intersecting boundaries during the International H2O Project (IHOP). Preprints, *31st International Conf. on Radar Meteorology*, Seattle, WA, Amer. Meteor. Soc., 782–785.
- Markowski, P. M., 2003: Mobile Doppler radar observations of a front during IHOP. Preprints, *31st International Conf. on Radar Meteorology*, Seattle, WA, Amer. Meteor. Soc., 786–788.
- Doswell, C. A. III, and P. M. Markowski, 2001: On the concept of relative buoyancy. Preprints, *18th Conf. on Weather Analysis and Forecasting*, Ft. Lauderdale, FL, Amer. Meteor. Soc., J16–J20.
- Markowski, P. M., E. N. Rasmussen, and J. M. Straka, 2000: Surface thermodynamic characteristics of RFDs as measured by a mobile mesonet. Preprints, *20th Conf. on Severe Local Storms*, Orlando, FL, Amer. Meteor. Soc., 251–254.
- Markowski, P. M., J. M. Straka, and E. N. Rasmussen, 1998: The sensitivity of storm-relative helicity to small hodograph changes and resolution. Preprints, *19th Conf. on Severe Local Storms*, Minneapolis, MN, Amer. Meteor. Soc., 363–366.
- Markowski, P. M., J. M. Straka, and E. N. Rasmussen, 1998: A preliminary investigation of the importance of helicity ‘location’ in the hodograph. Preprints, *19th Conf. on Severe Local Storms*, Minneapolis, MN, Amer. Meteor. Soc., 230–233.

Books

- Markowski, P., and Y. Richardson, 2010: *Mesoscale Meteorology in Midlatitudes*. Wiley-Blackwell, 424 pp.

Book Chapters

- Markowski, P. M., 2006: An overview of atmospheric convection. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 1–6.
- Markowski, P. M., 2006: The concept of buoyancy and its application to deep moist convection. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 7–16.

- Markowski, P. M., 2006: Convective storm initiation and organization. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 17-22.
- Markowski, P. M., 2006: Pressure fluctuations associated with deep moist convection. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 23–28.
- Markowski, P. M., 2006: Supercell thunderstorms. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 29–44.
- Markowski, P. M., 2006: Tornadoes and tornadogenesis. *Atmospheric Convection: Research and Operational Forecasting Aspects*. Springer-Verlag, 45–56.

Other Publications

- Markowski, P. M., 1997: Tips for avoiding lightning on the golf course. *Golf Illustrated*, **3(2)**, 14–15.

Invited Seminars

- “Tornadoes: What we can say (or can’t say) about the future,” *1st Annual Smeal Risk Management Symposium on Risk and Catastrophic Events* (keynote speaker), Smeal College of Business, Pennsylvania State University, University Park, Pennsylvania; 4/2012.
- “Discriminating between tornadic and nontornadic supercells,” National Weather Service, State College, Pennsylvania; 4/2012.
- “How to make a tornado,” Department of Atmospheric Sciences, Texas A&M University, College Station, Texas; 2/2012.
- “The Goshen County, Wyoming, supercell (5 June 2009) intercepted by VORTEX2: Interesting evolution leading up to tornadogenesis,” School of Meteorology, University of Oklahoma, Norman, Oklahoma; 11/2011.
- “The Goshen County, Wyoming, supercell (5 June 2009) intercepted by VORTEX2: Interesting evolution leading up to tornadogenesis,” Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania; 11/2011.
- “Tornadoes, cookies, and crackers,” Frank Talk, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania; 11/2011.
- “How to make a tornado,” Department of Atmospheric Sciences, Colorado State University, Fort Collins, Colorado; 4/2011.
- “An overview of the Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” *Minnesota Skywarn Workshop* (keynote speaker), Minneapolis, Minnesota; 4/2011.
- “Highlights from the Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” Frank Talk, Department of Meteorology, Pennsylvania State University, University Park, Pennsylvania; 12/2010.
- “Convective storm structure and evolution,” COMET (Cooperative Program for Meteorological Education and Training) Mesoscale Analysis and Prediction (COMAP) Course, Boulder, Colorado; 6/2010.

- “The effects of dry air aloft on convection,” National Weather Service, State College, Pennsylvania; 4/2010.
- “What vortex lines might be telling us about tornadogenesis,” Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida; 3/2010.
- “What vortex lines might be telling us about tornadogenesis,” Department of Atmospheric and Oceanic Sciences, University of Wisconsin, Madison, Wisconsin; 11/2009.
- “The theoretical aspects of tornadogenesis,” *College of Dupage Meteorology Department Severe Weather Conference*, Chicago, Illinois; 11/2009.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” *Chi Epsilon Pi Annual Awards Banquet* (presented jointly with Yvette Richardson), State College, Pennsylvania; 4/2009.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” *Public Forum at the American Meteorological Society Conference on Severe Local Storms* (presented jointly with Yvette Richardson and Erik Rasmussen), Savannah, Georgia; 10/2008.
- “What vortex lines might be telling us about tornadogenesis,” School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York; 10/2008.
- “What vortex lines might be telling us about tornadogenesis,” Stout Lecture, Department of Geosciences, University of Nebraska, Lincoln, Nebraska; 9/2008.
- “Tornadogenesis: Our current understanding and questions to guide future research,” St. Louis Chapter of the American Meteorological Society and National Weather Association, St. Louis, Missouri; 9/2008.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” *National Academies Board on Atmospheric Sciences and Climate; Forum on Cutting Edge Research and Development in the Observation, Understanding, and Prediction of Severe Weather* (presented jointly with Yvette Richardson), Woods Hole, Massachusetts; 6/2008.
- “Convective storm structure and evolution,” COMET (Cooperative Program for Meteorological Education and Training) Mesoscale Analysis and Prediction (COMAP) Course, Boulder, Colorado; 4/2008.
- “The nuts and bolts of tornadogenesis (at least as we think we understand it),” National Weather Service, State College, Pennsylvania; 4/2008.
- “Severe convective storms research at Penn State” (presented jointly with Yvette Richardson), National Weather Service, State College, Pennsylvania; 4/2008.
- “Severe convective storms research at Penn State” (presented jointly with Yvette Richardson), University of Oklahoma, Norman, Oklahoma; 3/2008.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” *National Weather Association Severe Storms Conference* (keynote speaker), Des Moines, Iowa; 3/2008.
- “Opportunities in severe storms research for physics students,” North Carolina A & T University, Greensboro, North Carolina; 11/2007.

- “Convective storm structure and evolution,” COMET (Cooperative Program for Meteorological Education and Training) Mesoscale Analysis and Prediction (COMAP) Course, Boulder, Colorado; 6/2007.
- “Tornado chasing: What I’ve learned,” Earth and Mineral Sciences Interest House (Irvin Hall), University Park, Pennsylvania; 4/2007.
- “The initiation of deep, moist, convection (CI): A review of the obvious and consideration of the not-so-obvious aspects of CI,” National Weather Service, State College, Pennsylvania; 4/2007.
- “Tornadogenesis: Our current understanding, operational considerations, and questions to guide future research,” *Northern Plains Convective Workshop*, Grand Forks, North Dakota; 4/2007.
- “Tornado chasing and opportunities in atmospheric science,” Villa Maria Academy (all-girls high school), Malvern, Pennsylvania; 1/2007.
- “The initiation of deep, moist, convection (CI): A review of the obvious and consideration of the not-so-obvious aspects of CI,” *10th High Plains Severe Weather Conference* (keynote speaker), Dodge City, Kansas; 10/2006.
- “Thunderstorms and their associated severe weather,” Department of Meteorology Summer Teachers Camp, University Park, Pennsylvania; 7/2006.
- “Tornadogenesis: What we know and don’t know,” National Weather Service, Philadelphia, Pennsylvania; 5/2006.
- “Tornado chasing: What I’ve learned,” Earth and Mineral Sciences Interest House (Irvin Hall), University Park, Pennsylvania; 4/2006.
- “Tornadogenesis: What we know and don’t know,” National Weather Service, State College, Pennsylvania; 4/2006.
- “Tornadogenesis: What we know and don’t know,” *National Storm Chasers Convention*, Denver, Colorado; 2/2006.
- “Conditional symmetric instability (CSI): Is it possible for anyone to really grasp what this is?,” National Weather Service, State College, Pennsylvania; 12/2005.
- “Advancing our understanding of tornadoes, their parent thunderstorms, and the larger-scale environment,” *National Weather Association Severe Storms Conference* (keynote speaker), Des Moines, Iowa; 3/2005.
- “Thunderstorms and their associated severe weather,” Department of Meteorology Summer Teachers Camp, University Park, Pennsylvania; 7/2004.
- “Tornadogenesis: Our current understanding,” Stout Lecture, Department of Geosciences, University of Nebraska, Lincoln, Nebraska; 10/2003.
- “Thunderstorms and their associated severe weather,” Department of Meteorology Summer Teachers Camp, University Park, Pennsylvania; 7/2003.
- “Tornadogenesis: Our current understanding,” Kansas City Chapter of the American Meteorological Society, Kansas City, Missouri; 6/2003.
- “Tornadogenesis: Our current understanding,” National Weather Service Central Region Headquarters, Kansas City, Missouri; 6/2003.

- “Forecasting severe storms,” National Weather Service, State College, Pennsylvania; 4/2003.
- “The importance of rear-flank downdraft thermodynamic characteristics on tornadogenesis,” *National Weather Association Severe Storms Conference* (keynote speaker), Des Moines, Iowa; 3/2003.
- “The latest in tornadogenesis research,” *National Emergency Managers Severe Weather Workshop*, Norman, Oklahoma; 2/2003.
- “Tornado chasing: What I’ve learned,” Department of Meteorology Weather Camp, University Park, Pennsylvania; 7/2002.
- “Thunderstorms and their associated severe weather,” Department of Meteorology Summer Teachers Camp, University Park, Pennsylvania; 6/2002.
- “Tornadogenesis: Our current understanding,” Research Experiences for Undergraduates program, National Severe Storms Laboratory; 6/2002.
- “Axisymmetric simulations of tornadogenesis resulting from the transport of circulation by downdrafts with varying thermodynamic characteristics,” National Severe Storms Laboratory, Norman, Oklahoma; 6/2002.
- “Maintenance of long-lived convective systems,” National Weather Service, State College, Pennsylvania; 4/2002.
- “Tornadogenesis: Our current understanding,” *College of Dupage Meteorology Department Severe Weather Conference*, Chicago, Illinois; 3/2002.
- “Tornado chasing: What I’ve learned,” Earth and Mineral Sciences Interest House (Irvin Hall), University Park, Pennsylvania; 2/2002.
- “Tornadogenesis: Our current understanding,” PSU Student Chapter of the AMS, University Park, Pennsylvania; 1/2002.
- “Surface thermodynamic characteristics of hook echoes and rear-flank downdrafts with implications for tornado genesis and maintenance,” High Plains Chapter of the National Weather Association, North Platte, Nebraska; 10/2001.
- “Surface thermodynamic characteristics of hook echoes and rear-flank downdrafts with implications for tornado genesis and maintenance,” Mesoscale and Microscale Meteorology (MMM) Division, National Center for Atmospheric Research, Boulder, Colorado; 5/2001.
- “Tornadogenesis ingredients: Lessons learned and new research,” National Weather Service, Springfield, Missouri; 4/2001.
- “Tornadogenesis ingredients: Lessons learned and new research,” National Weather Service, State College, Pennsylvania; 4/2001.
- “Surface thermodynamic characteristics of hook echoes and rear-flank downdrafts with implications for tornado genesis and maintenance,” Pennsylvania State University, University Park, Pennsylvania; 9/2000.
- “Surface thermodynamic characteristics of hook echoes and rear-flank downdrafts with implications for tornado genesis and maintenance,” University of Oklahoma, Norman, Oklahoma; 9/2000.

- “Mobile mesonet observations on 3 May 1999,” *National Symposium on the Great Plains Tornado Outbreak of 3 May 1999*, Oklahoma City, Oklahoma; 5/2000.
- “Variability of ‘environmental’ wind profiles and the role of boundaries during VORTEX,” *AMS Symposium on VORTEX: What We Have Learned—Where We Must Go*, Long Beach, California; 1/2000.
- “Some surface observations in hook echoes obtained by a mobile mesonet,” *AMS Symposium on VORTEX: What We Have Learned—Where We Must Go*, Long Beach, California; 1/2000.
- “Mobile mesonet observations on 3 May 1999,” Central Oklahoma Chapter of the AMS, Norman, Oklahoma; 9/1999.
- “Storm-relative helicity variability, low-level vorticity augmentation, and implications for tornado forecasting,” *NWS Southern Region Senior Forecaster Symposium*, Fort Worth, Texas; 7/1999.
- “Storm-relative helicity variability, low-level vorticity augmentation, and implications for tornado forecasting,” National Weather Service, Pleasant Hill, Missouri; 4/1999.
- “Storm-relative helicity variability, low-level vorticity augmentation, and implications for tornado forecasting,” National Weather Service, Norman, Oklahoma; 2/1999.
- “Boundaries and small-scale helicity variability during VORTEX, with implications for low-level mesocyclogenesis,” University of Oklahoma, Norman, Oklahoma; 4/1997.
- “A review of the origins of rotation in supercells and recent findings pertaining to tornadogenesis,” National Weather Service, State College, Pennsylvania; 4/1996.

Invited International Lectures

- “Supercells and tornadoes: The past, present, and future roles of observations and models in advancing our understanding,” *6th European Conference on Severe Storms* (keynote presentation), Palma de Mallorca, Spain; 10/2011.
- “Organization of isolated, deep moist convection,” *Summer School on Convective Storms*, Nanjing University, Nanjing, China; 7/2011.
- “Supercell thunderstorms,” *Summer School on Convective Storms*, Nanjing University, Nanjing, China; 7/2011.
- “Tornadoes,” *Summer School on Convective Storms*, Nanjing University, Nanjing, China; 7/2011.
- “Tornado research: The latest inferences from models and observations, and future directions,” *Summer School on Convective Storms*, Nanjing University, Nanjing, China; 7/2011.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” Peking University, Beijing, China; 7/2011.
- “Tornadogenesis: New insights from field observations and idealized numerical simulations,” *International Workshop on Convective Storms*, Beijing, China; 7/2011.
- “What vortex lines might be telling us about tornadogenesis,” Department of Physical Sciences, University of Helsinki, Helsinki, Finland; 10/2009.
- “A short course on convective storms,” Finnish Meteorological Institute, Helsinki, Finland; 10/2009.

- “What vortex lines might be telling us about tornadogenesis,” Ludwig-Maximilians-Universität, Munich, Germany; 10/2009.
- “What vortex lines might be telling us about tornadogenesis,” Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany; 8/2009.
- “Tornadogenesis: Our current understanding, operational considerations, and questions to guide future research,” Japan Meteorological Agency, Tokyo, Japan; 1/2008.
- “The Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2),” (presented jointly with J. Wurman) Japan Meteorological Agency, Tokyo, Japan; 1/2008.
- “Tornadogenesis: Our current understanding, operational considerations, and questions to guide future research,” *4th European Conference on Severe Storms* (keynote presentation), Trieste, Italy; 9/2007.
- “An overview of atmospheric convection,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.
- “The concept of buoyancy and its application to deep moist convection,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.
- “Convective storm initiation and organization,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.
- “Pressure fluctuations associated with deep moist convection,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.
- “Supercell thunderstorms,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.
- “Tornadoes and tornadogenesis,” Centre International Des Sciences Mecaniques, Udine, Italy; 7/2005.

Conference and Workshop Presentations

- “The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase,” *6th European Conf. on Severe Storms*, Palma de Mallorca, Spain; 10/2011.
- “The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase,” *35th AMS Conf. on Radar Meteorology*, Pittsburgh, Pennsylvania; 9/2011.
- “The Goshen County, Wyoming, supercell of 5 June 2009 intercepted by VORTEX2: Pretornadic phase,” *14th Conf. on Mesoscale Processes*, Los Angeles, California; 8/2011.
- “The role of barotropic versus baroclinic vorticity in tornadogenesis: Insights from very simple simulations,” *Cyclone Workshop*, Monterey, California; 4/2011.
- “Near-surface vortexgenesis in idealized three-dimensional numerical simulations involving a heat source and a heat sink in a vertically sheared environment,” *AMS 25th Conf. on Severe Local Storms*, Denver, Colorado; 10/2010.
- “VORTEX2: The Second Verification of the Origins of Rotation in Tornadoes Experiment,” *5th European Conference on Severe Storms*, Landshut, Germany; 10/2009.

- “The structure and evolution of vortex lines in supercell thunderstorms,” *AMS 24th Conf. on Severe Local Storms*, Savannah, Georgia; 10/2008.
- “Vortex lines observed within the low-level mesocyclones of supercells and what they might tell us about tornadogenesis,” *Cyclone Workshop*, Sainte-Adele, Quebec, Canada; 9/2008.
- “Some potentially interesting differences in the midlevel kinematic characteristics of a nontornadic and tornadic supercell observed by ELDORA during VORTEX,” *AMS 23rd Conf. on Severe Local Storms*, St. Louis, Missouri; 11/2006.
- “Sensitivity of a simulated supercell to emulated radiative cooling beneath the anvil,” *AMS 22nd Conf. on Severe Local Storms*, Hyannis, Massachusetts; 10/2004.
- “Observations of convection initiation failure on 12 June 2002,” *2nd IHOP Workshop*, Toulouse, France; 6/2004.
- “Considerations for VORTEX2,” *VORTEX2 Workshop*, Lone Wolf, Oklahoma; 9/2003.
- “Mobile Doppler radar observations of a front during IHOP,” *AMS 31st International Conf. on Radar Meteorology*, Seattle, Washington; 8/2003.
- “Dual-Doppler observations on 3 June 2002 and 12 June 2002,” *1st IHOP Workshop*, Boulder, Colorado; 3/2003.
- “Surface thermodynamic characteristics of RFDs as measured by a mobile mesonet,” *AMS 20th Conf. on Severe Local Storms*, Orlando, Florida; 9/2000.
- “A preliminary investigation of the importance of helicity location’ in the hodograph,” *AMS 19th Conf. on Severe Local Storms*, Minneapolis, Minnesota; 9/1998.
- “Anvil-generated baroclinity detected during the 8 June 1995 VORTEX intercept,” National Severe Storms Laboratory, Norman, Oklahoma; 11/1996.
- “Conserved variable analysis of PRE-STORM surface data,” University of Oklahoma, Norman, Oklahoma; 7/1995.

Grants Awarded

- NSF ATM-0801035, 6/1/2008–5/31/2012, \$964,389, “Collaborative Research: VORTEX2—Multi-Scale and Multi-Platform Study of Tornadoes, Supercell Thunderstorms, and Their Environments”
- NSF ATM-0644533, 4/19/2007–3/31/2012, \$747,592, “CAREER: A Study of the Radiative Effects of Cloud Shadows on the Dynamics of Long-Lived Convective Storms”
- NSF ATM-0437512, 11/1/2004–10/31/2007, \$450,186, “Collaborative Research: Study of the Genesis, Evolution, Structure, and Dynamic Climatology of Tornadoes and Their Environments”
- College of Earth and Mineral Sciences (Deike Research Grant), 6/1/2002–5/31/2003, \$45,000, “The Pennsylvania Mobile Radar Experiment (PAMREX)”
- NSF ATM-0338661, 1/15/2004–1/14/2006, \$221,831, “Collaborative Research: Concentrating Vorticity Near the Ground: Investigation of Supercell Rear-Flank Precipitation, Vorticity Generation, and Transport Processes”

- NSF ATM-021596, 1/1/2004–5/1/2005, \$482,978, “Studies of the Internal Structure and Dynamics of Convective Weather Systems”
- NSF ATM-010307, 1/15/2002–1/14/2005, \$221,289, “Collaborative Research: Measurement and Analysis of the Pre-Convective Boundary Layer and Convection Initiation during the International H₂O Project (IHOP)”
- UCAR NA97WD0082, 8/1/2002–7/31/2004, \$73,242, “Bow Echo Development Associated with the Interaction of Convection with Complex Terrain: Blending Observations with Idealized Simulations”
- NSF ATM-021596, 4/14/2003–4/13/2004, \$6,000, “REU Supplement for Collaborative Research: Measurement and Analysis of the Pre-Convective Boundary Layer and Convection Initiation during the International H₂O Project (IHOP)”
- College of Earth and Mineral Sciences (Wilson Research Initiation), 6/1/2002–5/31/2003, \$6741, “Kinematic Differences between Tornadic and Nontornadic Supercell Thunderstorms in the Middle Troposphere”
- NSF ATM-021596, 2/25/2002–2/24/2003, \$19,500, “REU Supplement for Collaborative Research: Measurement and Analysis of the Pre-Convective Boundary Layer and Convection Initiation during the International H₂O Project (IHOP)”

Academic Courses Taught

- Introductory Meteorology for Non-Majors (METEO 3)
- Synoptic Meteorology (METEO 411)
- Mesoscale Meteorology (METEO 414)
- Atmospheric Dynamics II (METEO 422)
- Observing Meteorological Phenomena (METEO 471W)
- Radar Observations and Analysis (METEO 497D/597D)
- Advanced Synoptic Meteorology (METEO 512)
- Atmospheric Convection (METEO 538)

Graduate Students Supervised

- Casey Webster, Ph.D., anticipated graduation in 2014
- Chris Nowotarski, Ph.D., anticipated graduation in 2013
- Tim Hatlee, M.S., anticipated graduation in 2012 (co-advised with Prof. Y. Richardson)
- Raphael Rogers, Ph.D. (co-advised with Prof. Y. Richardson)
- Andrew Oberthaler, M.S., 2011 (Thesis: “The Effect of Cloud Shading on Squall Lines: A Numerical Simulation Study”)

- Chris Nowotarski, M.S., 2010 (Thesis: “The Characteristics of Numerically Simulated Supercell Storms Situated over Statically Stable Boundary Layers”)
- Mario Majcen, Ph.D., 2009 (Dissertation: “A Conceptual Model of Nontornadic Supercells”)
- Jeff Frame, Ph.D., 2008 (Dissertation: “The Dynamical Influences of Cloud Shading on Simulated Supercell Thunderstorms”)
- Richard James, Ph.D., 2008 (Dissertation: “A Numerical Investigation of the Effects of Dry Air Aloft on Deep Convection”)
- Zack Byko, M.S., 2007 (Thesis: “Examining Descending Reflectivity Cores Using High-Resolution Radar Data and a Numerical Simulation”) (co-advised with Prof. Y. Richardson)
- Jeremy Ross, Ph.D., 2005 (Dissertation: “Reexamining Analog Forecasting Using NCEP/NCAR Reanalyses”)
- John Stonitsch, M.S., 2005 (Thesis: “The Fine-Scale Structure and Evolution of Boundary Layer Wind and Thermodynamic Fields along a Front Observed during IHOP”)
- Chris Shabbott, M.S., 2005 (Thesis: “Surface Thermodynamic Observations within the Forward-Flank Downdrafts of Tornadoic and Nontornadoic Supercells”)
- Christina Hannon, M.S., 2003 (Thesis: “An Investigation of Convection Initiation ‘Failure’ on 12 June 2002 Using Mobile Doppler Radars”)
- Jeff Frame, M.S., 2003 (Thesis: “The Interaction of Simulated Squall Lines with Idealized Terrain”)

Other Graduate Student Committees

- Benjamin Green, M.S., 2011
- Chris Melhauser, M.S., 2010
- Jim Marquis, Ph.D., 2010
- Ryan Hastings, M.S., 2009
- Robert Carver, Ph.D., 2008
- Lindsey Ritchie, M.S., 2008
- Jim Marquis, M.S., 2005
- Nettie Arnott, M.S., 2004
- Jeff Kron, M.S., 2004
- Jackie Kost, M.S., 2004
- Ken Loescher, M.S., 2004
- John Siewert, M.S., 2004
- Emily Kowalski, M.S., 2003
- Glen Auslander, M.S., 2003

Phillip Spencer, Ph.D., 2002

Research Associates Mentored

Richard James, 1/1/2004–12/1/2004

Undergraduate Students Involved with Research

Chris Nowotarski, 5/2008–5/2009

Matt Madigan, 7/2007–12/2007

Joseph Hoch, 8/2003–5/2004 (resulted in peer-reviewed publication in *Journal of Climate*)

John Stonitsch, 6/2003–12/2003

Elise Lancaster, 8/2001–8/2002 (resulted in peer-reviewed publication in *Weather and Forecasting*)

Joel Gratz, 5/2002–6/2002

Jessica Proud, 5/2002–6/2002

Benjamin Sipprell, 5/2002–6/2002

Greg Masi, 3/2001–5/2002 (Honors Thesis advisor)

Jeff Beck, 8/2001–5/2002

Select Honors and Awards

Nikolai Dotzek Award (European Severe Storms Laboratory), 2011 (for “outstanding contributions to the science of severe storms”)

Penn State University Alumni Achievement Award (Pennsylvania State University), 2010

American Meteorological Society Editor’s Award (*Weather and Forecasting*), 2009 (for “his careful, exceptionally timely and critical review of manuscripts resulting in considerable improvement in its scientific quality, and thereby contributing significantly to the high standards of the journal”)

NSF CAREER Award, 2007

Invited Lecturer at the International Center for Mechanical Sciences,
Udine, Italy, July 2005

Nominee for the Undergraduate Student Government Excellence in Advising
Award, Pennsylvania State University, 2003

School of Meteorology Award for Outstanding Performance as a Graduate Student,
University of Oklahoma, 1999

American Meteorological Society Fellowship, 1996–1997

National Science Foundation Fellowship Honorable Mention, 1997

National Science Foundation Fellowship Honorable Mention, 1996

Outstanding Service Award, Campus Weather Service, Pennsylvania State University, 1996

American Meteorological Society Father Macelwane Award (2nd place), 1996

John Dutton Award, Pennsylvania State University, 1996

Robert Cole Award (Meteorology), College of Earth and Mineral Sciences, Pennsylvania State University, 1995

University Scholar, Pennsylvania State University, 1992–1996 (the Honors College was renamed the Schreyer Honors College in 1997)

Departmental and College Committee Service

Meteorology Department Colloquium Series organizer, 8/2011–present

Meteorology Department Ombudsman, 9/2008–present

College of Earth and Mineral Sciences Museum and Art Gallery Advisory Board, 9/2008–present

College of Earth and Mineral Sciences Faculty Performance Evaluation Committee, 2010

Meteorology Department Undergraduate Academic Programs Committee, 8/2001–present (chair from 10/2006–7/2008)

College of Earth and Mineral Sciences Faculty Advisory Committee, 10/2006–6/2009

Meteorology Department Faculty Search Committee, 9/2007–4/2008 (chair)

College of Earth and Mineral Sciences Academy of Scholars Planning Committee, 10/2006–5/2007

College of Earth and Mineral Sciences Museum Exhibits Committee, 1/2005–12/2006

Meteorology Department Faculty Search Committee, 10/2004–6/2005

Meteorology Department Ad hoc General Education Committee (chair), 1/2004–1/2005

Meteorology Department Ad hoc Computers in the Curriculum Committee, 11/2002–12/2003 (co-chair)

College of Earth and Mineral Sciences Deike Renovation Task Force, 9/2002–5/2003

Meteorology Department Faculty Search Committee, 11/2002–6/2003

College of Earth and Mineral Sciences Facilities Task Force, 8/2002–9/2002

Scientific Society Memberships

American Meteorological Society, 1995–present

National Weather Association, 2011–present

External Service, Advisory Panels, and Other Activities

Chief Editor, *Weather and Forecasting*, 1/2012–present

Associate Editor, *Monthly Weather Review*, 1/2006–12/2010

Associate Editor, *Weather and Forecasting*, 1/2004–12/2011

Panelist at the NOAA-sponsored tornado and severe weather workshop entitled “Weather Ready Nation: A Vital Conversation,” 12/2011 (the intent of the workshop was to “initiate a national conversation among the users, service and science (physical and social) communities, including key stakeholders and America’s weather enterprise, to identify, prioritize, and set in motion actions to improve the nation’s resiliency against severe weather, especially tornadoes, to protect lives and property”)

VORTEX2 Steering Committee, 9/2003–6/2011

National Weather Service Quick Response Team (called on to survey violent tornado damage), 1/2003–12/2009

Workshop co-convenor, VORTEX2 Workshop at Penn State, 11/2009

National Science Foundation Observing Facilities Assessment Panel (OFAP), 10/2005–6/2010

National Severe Storms Laboratory Review Panel (2/2009)

5th European Conf. on Severe Storms Program Committee, 10/2008–10/2009

AMS 23rd Severe Local Storms Conference Program Committee, 10/2004–11/2006

Program Chair, AMS Symposium on the Challenges of Severe Convective Storms, 2/2006

AMS Science and Technology Advisory Committee on Severe Local Storms, 1/2003–1/2006

AMS 22nd Severe Local Storms Conference Program Committee, 1/2003–10/2004

Workshop convener, VORTEX2 Workshop at Quartz Mountain, 9/2003

Conference session chair

6th European Conf. on Severe Storms, Palma de Mallorca, Spain; 10/2011

AMS 25th Conf. on Severe Local Storms, Denver, Colorado; 10/2010

5th European Conf. on Severe Storms, Landshut, Germany; 10/2009

AMS 24th Conf. on Severe Local Storms, Savannah, Georgia; 10/2008

4th European Conf. on Severe Storms, Trieste, Italy; 9/2007

AMS 23rd Conf. on Severe Local Storms, St. Louis, Missouri; 11/2006

AMS Symposium on the Challenges of Severe Convective Storms, Atlanta, Georgia; 2/2006

AMS 22nd Conf. on Severe Local Storms, Hyannis, Massachusetts; 10/2004

AMS 21st Conf. on Severe Local Storms, San Antonio, Texas; 8/2002

AMS 20th Conf. on Severe Local Storms, Orlando, Florida; 9/2000

AMS Symposium on VORTEX, Long Beach, California; 1/2000

Field experiments

Second Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX2) (mobile mesonet coordinator), 5/2009–6/2009, 5/2010–6/2010

Pennsylvania Mobile Radar Experiment (PAMREX), 10/2004–11/2004, 10/2005–12/2005

International H₂O Project (IHOP), 5/2002–6/2002

National Geographic Society Tornado Project, 5/2001
Severe Thunderstorm Electrification and Precipitation Study (STEPS), 6/2000
Hurricanes At Landfall Experiment (HAL), 9/1998
SUB-VORTEX (Verification of the Origins of Rotation in Tornadoes Experiment), 5/1997–
6/1997, 5/1998–6/1998, 5/1999–6/1999 (Field Coordinator, 1998–1999)
Verification of the Origins of Rotation in Tornadoes Experiment (VORTEX), 5/1995–6/1995

Educational outreach

Delivered public lectures on tornadoes at the Whitaker Center (Harrisburg), 2012.
Science adviser for NSF-funded IMAX film, *Tornado Alley*, 2010–11.
Instructor for COMET (Cooperative Program for Meteorological Education and Training)
Mesoscale Analysis and Prediction (COMAP) Course (enrollment comprises Science Op-
erations Officers from the National Weather Service) hosted by the National Center for
Atmospheric Research (NCAR), 6/2007, 4/2008, 6/2010
Discussed opportunities in atmospheric science with students from underrepresented groups
(Villa Maria Academy, an all-girls high school, 1/2007; NC A & T University, an HBU,
11/2007)
Attracted funding and provided consultation for the construction of a tornado exhibit in the
College of Earth and Mineral Sciences Museum at Penn State
Instructor for high school teachers summer weather camp at Penn State University, 6/2002,
7/2003, 7/2004, 7/2006
Instructor for middle and high school students weather camp at Penn State University, 7/2002
Instructor and consultant for the *Passport to Knowledge* program for PBS, 3/2000–7/2001
Reviewer of materials used for Virtual Institute for Satellite Integration Training (VISIT)
courses, 10/2001
Over 100 radio, television, newspaper, and magazine interviews given to local, national, and
international media on severe storms and tornadoes since 1998, including *National Public
Radio*, *Scientific American*, *ABC World News*, *NBC Nightly News*, *The Weather Chan-
nel*, *Discovery Channel*, *The Learning Channel*, *National Geographic*, *The Washington
Post*, *Good Morning America*, *Agence France-Presse*, *Deutschlandfunk*, *The Philadelphia
Inquirer*, *NBC Dateline*, *CBS 48 Hours*, the *BBC*, and *USA Today*