

## Dr. Timothy A. Coleman

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## CURRICULUM VITAE

### 1. Education

Ph. D., M. S., The University of Alabama in Huntsville  
Atmospheric Science  
Dissertation: The Interactions of Atmospheric Waves With Tornadoes

B. S., Samford University  
Mathematics and Physics, graduated *magna cum laude*

### 2. Relevant Work Experience

#### A. **Research Meteorologist, Adjunct Professor**, The University of Alabama in Huntsville (2005-Present)

- Research on the effects of friction, topography, and wind channeling on tornadoes, convective initiation, and rainfall amounts
- Utilization of Doppler radar-derived wind data to analyze vorticity and convergence at gradients in friction, and study potential effects on tornadoes
- Research on the interactions of atmospheric waves with mesocyclones/tornadoes
- Research on non-traditional damaging winds (wake lows, waves, cold fronts)
- Research and development of innovative sheltering strategies to reduce injuries and fatalities in significant and violent tornadoes
- Research on the dynamics and effects of atmospheric wave phenomena, including ducted waves, internal waves, bores, and solitary waves
- Research on streamflow hydrology and climatology in the major river systems of Alabama using river gauge and rainfall data to examine potential water draws for agricultural irrigation
- Development of software to produce 3D wind fields that can be ingested into NWP, using VAD wind profiles and large fields of Doppler velocity data
- Development of BREAM model for siting of radars and to correct radar-estimated rainfall (QPE) for topographic beam blocking effects at current radar sites
- Development of software to produce 2D airflow trajectories
- Developed software to determine profiles of atmospheric variables using simple data from microwave profiling radiometers (MPR)
- Study of the history of tornado warnings and their dissemination
- Participated in field campaigns in hurricane and tornado environments
- Participated in numerous storm surveys
- Use of topo and land cover data to choose radar sites for field research
- Taught graduate courses in Atmospheric Science

- B. Consulting Meteorologist**, Coleman and Knupp, LLC (2009–Present)
- Provide expert analysis and testimony to attorneys/insurance/corporations
  - Research and/or expert testimony on over 40 cases
  - Development of highly accurate method for determining rainfall rates and amounts (QPE) using a combination of radar reflectivity data calibrated by nearby rain gauges
  - Use of dual-polarization radar data to improve radar QPE
  - Analysis of hail, lightning, temperature, and humidity data
  - Wrote 54-page manual on radar operation, including specifics on radar hardware for engineers and radar products for meteorologists, for NAB in 2015
  - Research on the use of sails in wind channeling areas to improve fuel efficiency on inland barges
  - Research on near-surface temperature lapse rates and potential impacts on HVAC industry
- C. Adjunct Professor**, Samford University, Physics Department (2012-2016)
- Taught Physics laboratory lectures
  - Assisted students with basic physics education, problems, and homework
- D. Severe Weather Expert**, WBRC-TV (2012-2018), WBMA-TV (2008-2012)
- Worked on air as “Severe Weather Expert” during wall-to-wall severe weather coverage
  - Writer for weather blogs, including alabamawx.com and myfoxtracker.com
- E. On-Camera Meteorologist**, WIAT-TV 42 (CBS), Birmingham, Alabama (2001-2004, 2018)
- Weekend and fill-in meteorologist, Chief Meteorologist 2003-2004
  - Prepared and delivered weather forecast for 5:00, 6:00, and 10:00 pm newscasts.
  - Severe weather coverage during tornado warnings
- F. Staff Severe Weather Meteorologist**, Clear Channel Radio, (2001–2002)
- Provided live coverage during tornado warnings
- G. Meteorologist**, NOAA/National Weather Service, Birmingham Office (1991–2000)
- Wrote and broadcast warnings, updates, observations, and forecasts on NOAA Weather Radio; worked as primary broadcaster during several tornado outbreaks
  - Prepared weather forecasts for the public, aviation, forestry, and agriculture
  - Involved in warning decision process for severe local storms
  - Trained on and used NEXRAD radar data, including reflectivity, velocity, and spectrum width; also used VIL, QPE, VAD, and other related products
  - Trained on and used numerical models to aid in forecasting and nowcasting
  - Trained on AFOS, AWIPS, CRS, Bufkit, PCGRIDDS, Sharp Workstation
  - Launched hundreds of radiosondes using weather balloons
  - Hand-analyzed surface and upper-air observation charts

### 3. Peer-Reviewed Publications

- **Coleman, T. A.**, and J. P. Dice, 2019: The 28 April 2014 “Snowmageddon” in Alabama and Georgia: Lessons Learned. *Elec. Journal Sev. Storms Met.*, in press.
- Weigel, A., R. Griffin, K. Knupp, A. Molthan, and **T. Coleman**, 2019: A spatial pattern analysis of land surface roughness heterogeneity and its relationship to the initiation of weak tornadoes. *Earth Interactions*, **23 (5)**, 1-28.
- **Coleman, T. A.**, A. W. Lyza, K. R. Knupp, W. Wyatt, and K. Laws, 2018: A significant tornado along a frontogenetical thermal boundary during VORTEX-SE. *Elec. Journal Sev. Storms Met.*, **13**, 1-25.
- **Coleman, T. A.**, and K. R. Knupp, 2016: Review and case studies of non-traditional severe local windstorms. *J. Oper. Meteor.*, **4**, 192-206.
- **Coleman, T. A.**, and P. G. Dixon, 2014: An objective analysis of tornado risk in the United States. *Wea. Forecasting*, **29**, 366-376.
- **Coleman, T. A.**, T. A. Murphy, R. A. Wade, K. R. Knupp, and L. D. Carey, 2014: Analysis of the transition region of a winter storm. *J. Oper. Meteor.*, **2**, 1-13.
- Knupp, K. R., T. A. Murphy, **T. A. Coleman**, R. A. Wade, S.A. Mullins, C.J. Schultz, E.V. Schultz, L. Carey, E. W. McCaul, B. Carcione, S. Latimer, A. Kula, K. Laws, P.T. Marsh, and K. Klockow, 2014: Meteorological overview of the devastating 27 April 2011 tornado outbreak. *Bull. American Meteorological Soc.*, **95**, 1041–1062.
- Mecikalski, J. R., X. Li, L. D. Carey, E. W. McCaul, Jr., and **T. A. Coleman**, 2013: Regional comparison of GOES cloud-top properties and radar characteristics in advance of first-flash lightning initiation. *Mon. Wea. Rev.*, **141**, 55-74.
- **Coleman, T. A.**, 2012: A long-lived nocturnal bore on radar: Diagnosis and relevance. *Electronic J. Operational Meteor.*, **13**, 103 - 107.
- **Coleman, T. A.**, and K. R. Knupp, 2011: A Review of Three Significant Wake Lows over Alabama and Georgia. *Wea. Forecasting*, **26**, 766-773.
- **Coleman, T. A.**, and K. R. Knupp, 2011: Radiometer and profiler analysis of the effects of a bore and a solitary wave on the stability of the NBL. *Mon. Wea. Rev.*, **139**, 211-223.
- **Coleman, T. A.**, K. R. Knupp, J. Spann, J. B. Elliott, and B. E. Peters, 2011: The history and future of tornado warning dissemination in the United States. *Bull. Amer. Met. Soc.*, **92**, 567-582.
- **Coleman, T. A.**, K. R. Knupp, and D. E. Herzmann, 2010: An undular bore and gravity waves illustrated by dramatic time-lapse photography. *J. Atmos. Oceanic Tech.*, **27**, 1355-1361.
- **Coleman, T. A.**, and K. R. Knupp, 2010: A nonlinear impedance relation for the surface winds in pressure disturbances: Theory and numerical simulations. *J. Atmos. Sci.*, **67**, 3409-3422.
- **Coleman, T. A.**, and K. R. Knupp, 2009: Factors affecting surface wind speeds in gravity waves and wake lows. *Wea. Forecasting.*, **24**, 1664-1679.

- **Coleman, T. A.**, K. R. Knupp, and J. T. Tarvin, 2009: Review and case study of sounds associated with the lightning electromagnetic pulse. *Mon. Wea. Rev.*, **137**, 3129-3136.
- **Coleman, T. A.**, and K. J. Pence, 2009: The proposed 1883 Holden tornado warning system: Its genius and its applications today. *Bull. Amer. Meteor. Soc.*, **90**, 1905-1912.
- **Coleman, T. A.**, and K. R. Knupp, 2008: The interactions of gravity waves with mesocyclones: Preliminary observations and theory. *Mon. Wea. Rev.*, **136**, 4206-4219.
- **Coleman, T. A.**, and K. R. Knupp, 2008: The spectacular undular bore in Iowa on 2 October 2007. *Mon. Wea. Rev.*, **137**, 495-503.
- Knupp, K. R., R. Ware, D. Cimini, F. Vandenberghe, J. Vivekanandan, E. Westwater, **T. A. Coleman**, and D. Phillips, 2008: Ground-based passive microwave profiling during dynamic weather conditions. *J. Atmos. Oceanic Tech.*, **26**, 1057–1073.

#### 4. Invited Presentations

- Coleman, T. A., 2018: Using Radar Data to Generate High-Resolution Rainfall Estimates. *27th Annual Southeastern Environmental Law & Regulation Conference, Destin, FL.*
- Coleman, T. A., 2017: Using High-Resolution Radar Rainfall Estimates in Project Planning and Claims Management. *Birmingham Environmental Professionals Association Annual Meeting, Birmingham, AL.*
- Coleman, T. A., 2016: The Effects of Weather on Construction Claims and Contracts (Rain gauge calibrated radar QPE). *3<sup>rd</sup> Annual Construction Law Summit, Birmingham, AL.*
- Coleman, T. A., 2014: Potential novel methods of tornado sheltering in the home. *City of Birmingham, Department of Community Development.*
- Coleman, T. A., 2012: A review of the 27 Apr 2011 tornado outbreak. *NASA Marshall Space Flight Center, Huntsville, AL.*
- Coleman, T. A., 2010: Current research on severe weather at UAH. *The University of Alabama, Tuscaloosa, AL.*
- Coleman, T. A., 2006-2009: Atmospheric waves and their effects on the sensible weather. *Presented at NOAA/National Weather Service Forecast Offices in Mobile, AL; Atlanta, GA; Jackson, MS; Huntsville, AL; Birmingham, AL; Knoxville, TN; Nashville, TN; Chicago, IL; Indianapolis, IN.*
- Coleman, T. A., and R. T. McNider, 2009: White paper on streamflows and potential water withdrawals for agriculture in Alabama. Prepared for Alabama Department of Environmental Management.
- Coleman, T. A., 2009: External mesoscale factors influencing mesocyclones and tornadoes. *National Severe Storms Laboratory Colloquium, Norman, OK.*
- Coleman, T. A., 2008: Atmospheric waves and their effects on the sensible weather. *The Weather Channel, Atlanta, GA.*
- Coleman, T. A., 2008: Gravity waves and their effects on the sensible weather. *The University of South Alabama, Mobile, AL.*
- Coleman, T. A., 2007: Gravity waves and their effects on the sensible weather. *NSSTC Brownbag Seminar Series, Huntsville, AL.*
- Coleman, T. A., 2005: Gravity waves and their interactions with tornadoes and thunderstorms. *Physics Seminar Series, Samford University, Birmingham, AL.*

## 5. Selected Conference Presentations

- Coleman, T. A., and J. P. Dice, 2018: The 28 January 2014 “Snowmageddon” in the Southeastern U.S. *American Meteorological Society (AMS) 29th Conference on Weather Analysis and Forecasting, Denver, CO.*
- Coleman, T. A., and K. R. Knupp, 2018: Shear Available Potential Energy (SHAPE): A Quantitative Measure of the Effect of Wind Shear on Convective Updraft Potential. *AMS 29th Conference on Weather Analysis and Forecasting, Denver, CO.*
- Coleman, T. A., K. R. Knupp, and P. N. Gatlin, 2017: High-Resolution Doppler Radar and Radiometer Analysis of a Cold Front Topped with Atmospheric Waves. *38<sup>th</sup> Conference on Radar Meteorology, Chicago, IL.*
- Coleman, T. A., 2017: Using Single- and Dual-Doppler Analysis to Examine the Vorticity and Convergence Along Gradients in Roughness Length. *38<sup>th</sup> Conference on Radar Meteorology, Chicago, IL.*
- Coleman, T. A., and A. M. Weigel, 2016: The Effects of Differential Friction on PBL Kinematics and Possible Influences on Mesocyclones and Tornadoes. *AMS 28<sup>th</sup> Conference on Severe Local Storms, Portland, OR.*
- Coleman, T. A., A. W. Lyza, R. Wade, K. Knupp, and W. Wyatt, 2016: A Significant Tornado Near a Frontogenetical Boundary During VORTEX-SE. *AMS 28<sup>th</sup> Conference on Severe Local Storms, Portland, OR.*
- Coleman, T. A., and K. R. Knupp, 2015: Mapping the Impact of Surface Roughness on the Kinematics of the 3D Wind Field. *37<sup>th</sup> Conference on Radar Meteorology, Norman, OK.*
- Coleman, T. A., and K. R. Knupp, 2013: Analysis of the effects of wind channeling and gradients in roughness length on environmental vorticity and helicity. *36<sup>th</sup> Conference on Radar Meteorology, Breckenridge, CO.*
- Coleman, T. A., K. R. Knupp, and T. A. Murphy, 2012: The Dynamics and Morphology of Two Long-Track Tornadic Supercells on 27 April 2011. *Special Symposium on the Tornado Disasters of 2011, New Orleans, LA.*
- Coleman, T. A., 2012: Sudden re-intensification of storms due to synoptic effects. *9th Southeastern Coastal and Atmospheric Processes Symposium, Mobile, AL.*
- Coleman, T. A., and K. R. Knupp, 2011: The rare synoptic and mesoscale setup leading to the 27 Apr 2011 tornado outbreak. *36<sup>th</sup> Annual Meeting of the National Weather Association, Birmingham, AL.*
- Coleman, T. A., and K. R. Knupp, 2011: Topographic and land cover effects on mesocyclones and tornadoes. *35<sup>th</sup> Conference on Radar Meteorology, Pittsburgh, PA.*
- Coleman, T. A., and K. R. Knupp, 2010: Examination of an intense wake low event as a severe local storm. *AMS 25<sup>th</sup> Conference on Severe Local Storms, Denver, CO.*

- Coleman, T. A., and J. A. Westland, 2010: Underestimation of QPE in a flash flood situation due to partial radar beam blocking: Correction using the BREAM model. *AMS 24<sup>th</sup> Conference on Hydrology, Atlanta, GA.*
- Coleman, T. A., 2010: The history (and future) of tornado warning dissemination in the United States. *8<sup>th</sup> Presidential History Symposium, American Meteorological Society, Atlanta, GA.*
- Coleman, T. A., D. Phillips, and K. R. Knupp, 2009: Radar, profiler, and radiometer analysis of the effects of multiple bores/solitary waves on the stability of the NBL and associated CI. *34<sup>th</sup> Conference on Radar Meteorology, Williamsburg, VA.*
- Coleman, T. A., and K. R. Knupp, 2009: Radar analysis of the airflow over geographic features that may affect mesocyclone intensity and tornadogenesis. *34<sup>th</sup> Conference on Radar Meteorology, Williamsburg, VA.*
- Coleman, T. A., 2009: Mesoscale Processes that may Impact Mesocyclone Intensity and Tornadogenesis. *6<sup>th</sup> Southeastern Coastal and Atmospheric Processes Symposium, Mobile, AL.*
- Coleman, T. A., and K. R. Knupp, 2008: BREAM: A simple but effective model to allow better radar QPE in flash flood situations for radars with partial beam blocking. *AMS 22<sup>nd</sup> Conference on Hydrology, Atlanta, GA.*
- Coleman, T. A., 2008: The 1883 Holden tornado warning system and its applications today. *6<sup>th</sup> Presidential History Symposium, American Meteorological Society, Atlanta, GA.*
- Coleman, T. A., K. R. Knupp, and C. Crowe, 2008: Mesoscale phenomena affecting the Alabama EF-4 tornadoes during the Super Tuesday Tornado Outbreak of 5-6 February 2008. *AMS 24<sup>th</sup> Conference on Severe Local Storms, Savannah, GA.*
- Coleman, T. A., and K. R. Knupp, 2007: Doppler Radar Observations of the Interactions of Gravity Waves with Mesocyclones. *33<sup>rd</sup> Conference on Radar Meteorology, Cairns, Queensland, Australia.*
- Coleman, T. A., and K. R. Knupp, 2007: Convective initiation via outflow boundary interaction with quasi-stationary thermal circulations. *AMS 12<sup>th</sup> Conference on Mesoscale Processes, Waterville Valley, NH.*
- Coleman, T. A., 2007: Propagation modes in QLCS's: Density Currents, Bores, and Gravity Waves. *Midwest Bow Echo Workshop, Louisville, KY.*
- Coleman, T. A., and K. R. Knupp, 2006: The interactions of gravity waves with mesocyclones and tornadoes: Theories and Observations. *AMS 23<sup>rd</sup> Conference on Severe Local Storms, St. Louis, MO.*

## 6. Teaching experience

### A. Graduate (UAH)

- ATS 551, Atmospheric Fluid Dynamics I
- ATS 651, Atmospheric Fluid Dynamics II
- ATS 690, Atmospheric Waves

### B. Undergraduate

- PHYS 101L, 102L, Physics Laboratory (Samford University)
- GEOG 150, Physical Geography (Samford University)
- Non-credit courses in Severe Storms (Jefferson State Community College)

## 7. Other academic service

- Service on the committees of 7 M.S./Ph.D. students
- Serve as reviewer for the following journals:
  - The Quarterly Journal of the Royal Meteorological Society*
  - Bulletin of the American Meteorological Society*
  - Monthly Weather Review*
  - Weather and Forecasting*
  - The Journal of Climatology*
  - The Journal of Hydrometeorology*
  - The Journal of Applied Meteorology and Climatology*
  - The Electronic Journal of Operational Meteorology*
  - Climate Research*
  - Weather Climate and Society*



## **8. Media Coverage of Research**

The Weather Channel Live Interviews, April 2010, October 2013

*The Birmingham News* (front page), *The Tuscaloosa News*, *The Cleburne Times*

Science@NASA national newsletter

Interviewed by American Institute of Physics about dissertation work for nationally-syndicated

TV news story, to be distributed to 62 local TV stations in the U. S. and Canada

Physorg.com, terradaily.com, talkweather.com, nwas.org, al.com, newsrx.com, newswise.com, wvua.com, myfoxny.com, myfoxla.com

## **9. Honors and Professional Memberships**

Member, American Meteorological Society

Member, National Weather Association

Member, Marquis Who's Who in America

U. S. Dept. of Commerce Bronze Medal

NOAA Citation for Extraordinary Work During Tornado Outbreak

Howard College of Arts and Sciences Advisory Board, Samford University

*Phi Kappa Phi*, academic honor fraternity

*Pi Mu Epsilon*, mathematics honor society

Physics Achievement Award, Samford University

Winner, National Science Olympiad Meteorology Event (8<sup>th</sup> grade)