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1. PERSONAL HISTORY AND PROFESSIONAL EXPERIENCE

A. Educational Background

B.S. in Meteorology with honors (*summa cum laude*), State University of New York College at Oswego, 1997
M.S. in Meteorology, Texas A&M University, 1999
Ph.D. in Meteorology, University of Utah, 2003

B. List of Academic Positions Since Final Degree

Assistant Professor, Dept. of Atmospheric Sciences, University of Illinois at Urbana-Champaign, 2006 – 2012
Associate Professor, Dept. of Atmospheric Sciences, University of Illinois at Urbana-Champaign, 2012 – present
Affiliate, Computational Science and Engineering, University of Illinois at Urbana-Champaign, 2014 – present
Affiliate, Center for Latin American Studies, University of Illinois at Urbana-Champaign, 2015 – present
Visiting Professor, Dept. de Ciencias de la Atmósphera y los Océanos, Universidad de Buenos Aires, Spr 2015

C. Other Professional Employment

Undergraduate Research Assistant, State University of New York College at Oswego, Oswego, NY, 1995 –1997
Graduate Teaching Assistant, Department of Meteorology, Texas A&M University, College Station, TX, 1997
Graduate Research Assistant, Tropical Convection Research Program, Department of Meteorology, Texas A&M University, College Station, TX, 1997 –1999
Graduate Research Assistant, Tropical Meteorology Group, University of Utah, Salt Lake City, UT, 1999 – 2003
Research Scientist I, Dept. of Atmospheric Sciences, Colorado State University, 2003 – 2005
Research Scientist II, Dept. of Atmospheric Sciences, Colorado State University, 2005 – 2006
Research Fellow, Consejo Nacional de Investigaciones Científicas y Técnicas, Centro de Investigaciones del Mar y la Atmósfera, Argentina, Spr 2015
Visiting Scientist, Servicio Meteorológico Nacional, Argentina, Spr 2015

D. Honors, Recognitions, and Prizes

Highly Meritorious Meteorology Senior Award, State University of New York College at Oswego, 1997
Excellence in Graduate Research Award, University of Utah, 2003
NASA Earth System Science Graduate Fellowship, 2001-2003
Editors' Citation for Excellence in Refereeing for *Journal of Geophysical Research – Atmospheres*, AGU, 2006
NASA New Investigator Award, 2008
NASA Group Achievement Award, *Genesis and Rapid Intensification Project* field campaign, 2011
Editors' Citation for Excellence in Refereeing for *Journal of Geophysical Research – Atmospheres*, AGU, 2011
Co-Chair, AMS 35th Conference on Radar Meteorology, Pittsburgh, PA, 2011
Honors Council, College of Liberal Arts and Sciences, University of Illinois, 2012-2014
List of Teachers Ranked as Excellent:
ATMS 403 Spring 2007, Fall 2007, Fall 2009, ATMS 406 Fall 2009
University of Illinois, College of Liberal Arts and Sciences, Reflective Teaching Seminar, 2010-11 academic year
Elected chair, Scientific and Technical Advisory Committee on Radar Meteorology, AMS, 2013-2016
Program theme lead and organizing committee, AMS 36th Conference on Radar Meteorology, Breckenridge, CO, Oct 2013
Organizing committee, 8th European Conference on Radar in Meteorology and Hydrology, Garmisch-Partenkirchen, Germany, Sep 2014
Research Fellowship, Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina, Spring 2015
NASA Robert H. Goddard Award, *Global Precipitation Measurement mission* ground validation team for exceptional achievement in science, 2015
NASA Group Achievement Award, *Global Precipitation Measurement mission* science team, 2015

Program theme lead and organizing committee, AMS 37th Conference on Radar Meteorology, Norman, OK, Sep 2015
Organizing committee, 8th European Radar and Hydrology Conference, Antalaya, Turkey, Oct 2016
AMS award for Outstanding Service as Member and Chair, Radar Meteorology, 2016
Science Advisory Group, NASA Aerosol and Clouds, Convection, and Precipitation (A-CCP) mission, 2018 -
List of Teachers Ranked as Excellent:
ATMS 571 Fall 2014, ATMS 505 Spring 2013

E. Invited Lectures and Invited Conference Presentations Since Last Promotion

Advanced dual-polarization radar applications, Federal University of Santa Maria, Santa Maria, Rio Grande do Sul, Brazil, Dec 2012
NASA Global Precipitation Measurement Mission Ground Validation, Argonne National Laboratory, Chicago, IL, Jan 2013.
NASA Global Precipitation Measurement Mission Ground Validation, University of Wisconsin-Madison, Madison, WI, Mar 2013.
Microphysics research using matched radar-aircraft analyses, NASA Precipitation Measurement Missions Science Team Meeting, Annapolis, MD, Mar 2013.
Science activities of the Global Precipitation Measurement Missions Drop Size Distribution Working Group, 6th NASA GPM Ground Validation Workshop, Rome, Italy, Nov 2013.
What we don't know about snow: Snowfall retrieval science in the Global Precipitation Measurement Mission. Program on Atmospheres, Oceans, and Climate, Massachusetts Institute of Technology, Cambridge, Massachusetts, Nov 2013.
Building the GPM-GV Column from the GPM Cold season Precipitation Experiment. AGU Fall Meeting, San Francisco, California, Dec 2013.
What we don't know about snow: Snowfall retrieval science in the Global Precipitation Measurement Mission. Department of Atmospheric Sciences, University of North Dakota, Grand Forks, North Dakota, Dec 2014.
RELAMPAGO. World Meteorological Organization, Working Group on Nowcasting Research, Montreal, Canada, Jul 2014.
RELAMPAGO. Geosciences Division, National Science Foundation, Arlington, Virginia, Aug 2014.
RELAMPAGO. Universidad Nacional de Cuyo, Mendoza, Argentina, Apr 2015.
RELAMPAGO. Universidad Nacional de Córdoba, Cordoba, Argentina, Apr 2015.
RELAMPAGO. Universidad de Buenos Aires, Buenos Aires, Argentina, May 2015.
Improving Cold Season Precipitation Retrievals with GPM Ground Validatation Data. 7th NASA Global Precipitation Measurement Ground Validation Workshop, Seoul, Korea, May 2015.
RELAMPAGO. Conference Keynote Presentation. XII Argentine Congress on Meteorology, Mar del Plata, Argentina, May 2015.
What we don't know about snow: Snowfall retrieval science in the Global Precipitation Measurement Mission. School of Architecture, Civil, and Environmental Engineering, École Polytechnique Fédéral de Lausanne, Lausanne, Switzerland, Jun 2015.
Constraining Global Precipitation Measurement Mission retrievals with GPM Field Campaign observations. NASA Precipitation Measurement Missions Science Team meeting.
Radar operations during the CACTI field campaign. Atmospheric Radiation Measurement Radar Meeting, Miami, Florida, Feb 2016.
Processes, prediction, and societal impacts of intense convection in subtropical South America. Environmental Sciences Division, Argonne National Laboratory, Mar 2016.
Processes, prediction, and societal impacts of intense convection in subtropical South America. NASA Marshall Space Flight Center and University of Alabama-Huntsville, Mar 2016.
CACTI-RELAMPAGO synergy. Atmospheric Radiation Measurement Atmospheric Systems Research Science Team Meeting, Tysons, Virginia, Apr 2016.
A critical evaluation of the GPM DPR algorithm assumptions using OLYMPEX data, OLYMPEX Workshop, Seattle, Mar 2017.
RELAMPAGO. Atmospheric Radiation Measurement Atmospheric Systems Research Science Team Meeting, Tysons, Virginia, Mar 2017.
A critical evaluation of the GPM DPR algorithm assumptions using OLYMPEX data, OLYMPEX Workshop, Seattle, Mar 2017.
RELAMPAGO. Atmospheric Radiation Measurement Atmospheric Systems Research Science Team Meeting, Tysons, Virginia, Mar 2017.

Resumen del Proyecto RELAMPAGO-CACTI. Servicio Meteorológico Nacional, Buenos Aires, Jul 2017.
Triple-frequency radar observations of snow in OLYMPEX. NASA Precipitation Measurement Missions Science Team meeting.
Proyecto RELAMPAGO-CACTI. AGU Fall Meeting, New Orleans, Louisiana, Dec 2017.
Earth system observations for societal benefit, Space Science and Engineering Center, University of Wisconsin-Madison, May 2018.
Proyecto RELAMPAGO-CACTI. Ministry of Science, Technology, and Innovation, Buenos Aires, Jun 2018.
Proyecto RELAMPAGO-CACTI. Universidad Nacional de Córdoba, Córdoba, Argentina, Jun 2018.
Orographic convective initiation and upscale growth. Invited keynote presentation, 4th Symposium on Radar and Hydrometeorological Systems, Córdoba, Argentina, Sep 2018.
Radar Meteorology, Advanced Study Institute-RELAMPAGO, National Science Foundation, Nov 2018.
Chasing the World's Most Intense Thunderstorms: Proyecto RELAMPAGO-CACTI Argentina 2018, American Meteorological Society Annual Meeting, Phoenix, Arizona, Jan 2019.

F. Offices Held in Professional Societies

President-elect, Central Illinois Chapter of the AMS, 2007
President, Central Illinois Chapter of the AMS, 2007 – 2009
Chair, Scientific and Technical Advisory Committee on Radar Meteorology, AMS, 2013 – 2016

G. Editorships of Journals and Other Learned Publications

Editor, Journal of Applied Meteorology and Climatology, AMS, 2010 – 2014

H. Grants Received

Title:	Creation and Analysis of C3VP Synthesis Datasets for Global Precipitation Mission Algorithm Development and Evaluation
Granting Agency:	NASA, Global Precipitation Mission Ground Validation Program
Dates of Award:	5/15/07 – 5/14/08
Award Amount:	$20 K
Role:	Principal investigator

Title:	Diurnal variations and forcing of precipitation systems in the North American Monsoon system
Granting Agency:	NOAA, Climate Prediction Program for the Americas Program
Dates of Award:	8/1/07 – 7/31/11
Award Amount:	$285 K
Role:	Principal investigator

Title:	Analysis of C3VP Synthesis Datasets for Global Precipitation Mission Algorithm Development and Evaluation
Principal Investigator:	Stephen W. Nesbitt
Granting Agency:	NASA, Global Precipitation Mission Ground Validation Program
Dates of Award:	5/15/08 – 5/14/09
Role:	Principal investigator

Title:	Improving the Measurement and Understanding of Orographic Precipitation using NASA Satellite Measurements
Principal Investigator:	Stephen W. Nesbitt
Granting Agency:	NASA, Global Precipitation Mission Ground Validation Program
Dates of Award:	8/1/08 – 5/31/12
Role:	Principal investigator

Title:	Application of NASA Field Observations, Satellite Retrievals and High Resolution WRF Simulations to Study Physical and Dynamical Processes Governing Tropical Cyclone Rainfall and Intensity Change
Granting Agency:	NASA, Hurricane Science Research Program
Dates of Award:	1/1/09 – 12/31/12

Amount:	$614 K ($270 K to SN)
Role:	Principal investigator (Lead PI: Greg McFarquhar, Univ. Illinois)

Title:	Coupling Between Weather, Climate, and Landscape Evolution in the Western Ghats of India
Granting Agency:	NSF, Geomorphology and Land Use Dynamics
Dates of Award:	7/1/09 – 3/31/14
Award Amount:	$665 K ($334 K to SN)
Role:	Principal investigator (lead PI: Alison Anders, Univ. Illinois)

Title:	Remote sensing and modeling studies of dynamical and microphysical processes in tropical cyclone intensification
Granting Agency:	NASA, Earth System Science graduate fellowship for Daniel Harnos
Dates of Award:	9/1/10 –8/31/13
Amount:	$75 K
Role:	Principal investigator

Title:	Synthesis of aircraft and ground based measurements for NASA GPM algorithm validation
Granting Agency:	NASA, Global Precipitation Mission Ground Validation Program
Dates of Award:	10/1/10 – 9/30/12
Amount:	$180 K
Role:	Principal investigator

Title:	An orographic optimization technique for improved satellite quantitative precipitation estimation in complex terrain
Granting Agency:	NASA, Earth System Science graduate fellowship for Kimberly Reed
Dates of Award:	9/1/11 –8/31/14
Amount:	$75 K
Role:	Principal investigator

Title:	GPM field campaign aircraft and radar data synergy for algorithm improvement and error characterization
Granting Agency:	NASA, Precipitation Measurement Mission
Dates of Award:	2/4/13 – 2/3/16
Amount:	$474 K
Role:	Principal investigator

Title:	Illinois continued participation in Global Precipitation Mission field campaigns and analysis
Granting Agency:	National Aeronautics and Space Administration, Global Precipitation Mission Ground Validation Program
Dates of Award:	5/16/13 – 5/15/14
Amount:	$70 K
Role:	Principal investigator

Title:	Properties of ice and mixed phase particles in GPM-Ground Validation Field Campaigns
Granting Agency:	National Aeronautics and Space Administration, Global Precipitation Mission Ground Validation Program
Dates of Award:	5/16/14 – 5/15/15
Amount:	$75 K
Role:	Principal investigator

Title:	Improving spaceborne falling snow retrievals using in situ data, particle models, and validation
Granting Agency:	NASA, Earth System Science graduate fellowship for George Duffy
Dates of Award:	9/1/14 –8/31/17
Amount:	$75 K

Role:	Principal investigator

Title:	Using scatterometer-measured vector winds to study high-impact weather events
Granting Agency:	NASA, Ocean Vector Winds Science Team
Dates of Award:	7/1/14 – 6/30/18
Amount:	$600 K to SN
Role:	Principal investigator (lead PI: Timothy J. Lang, NASA MSFC)

Title:	Influence of potential vorticity anomalies on flash flood-producing convective systems in subtropical South America
Granting Agency:	NSF – Graduate Research Fellowship for Stella Choi
Dates of Award:	9/1/15 – 8/31/18
Amount:	$90 K
Role:	Principal investigator

Granting Agency:	University of Illinois Vice Chancellor for Research
Dates of Award:	1/1/15 – 1/1/16
Title:	SCAMP: System for Characterizing And Measuring Precipitation
Amount:	$90 K for instrumentation for the department
Role:	Principal investigator (lead PI: Sonia Lasher-Trapp, Univ. Illinois)

Principal Investigator:	Stephen W. Nesbitt (lead PI: Robert J. Trapp)
Granting Agency:	DOE – Office of Science
Dates of Award:	9/1/15 – 8/31/18
Title:	A Bottom-up Approach to Improve the Representation of Deep Convective Clouds in Weather and Climate Models
Amount:	$551 K ($184 K to SN)
Role:	Principal investigator (lead PI: Robert J. Trapp)

Title:	Cloud, Aerosol, and Complex Terrain Interactions (CACTI) Experiment
Granting Agency:	DOE – Office of Science
Dates of Award:	8/1/18 – 4/30/18
Equipment allocation:	Facilities grant: deployment of ~ $10 million in facilities for CACTI to Argentina
Role:	Principal investigator (lead PI: Adam Varble, Univ. Utah)

Title:	Participation in the OLYMPEX Field Campaign
Granting Agency:	NASA, Global Precipitation Mission Ground Validation Program
Dates of Award:	10/1/15 – 9/30/16
Amount:	$75 K
Role:	Principal investigator

Title:	Ice and mixed phase precipitation system retrieval validation for improved multifrequency spaceborne precipitation measurements
Granting Agency:	NASA, Precipitation Measurement Missions
Dates of Award:	2/4/16 – 2/3/19
Amount:	$450 K
Role:	Principal investigator

Title:	CAMP2Ex leadership, flight planning and integrative analysis for addressing heterogeneity issues in observing aerosol induced changes to cloud and precipitation properties
Granting Agency:	NASA
Dates of Award:	8/1/17 – 7/4/19
Amount:	$450 K ($150 K to SN)
Role:	Principal investigator (lead PI: Larry Di Girolamo, Univ. Illinois)

Title: RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations) Scientific Overview Document and Experimental Design Overview Document
Dates of Award: 8/1/18 – 7/31/18
Granting Agency: NSF, Physical and Dynamical Meteorology
Equipment allocation: approx. $15 million in observing facilities ($30 K to SN for project planning)
Role: Principal investigator

Title: Collaborative research: Use of RELAMPAGO observations to understand the thermodynamic, kinematic, and dynamic processes leading to heavy precipitation
Amount: $650 K
Granting Agency: NSF, Physical and Dynamical Meteorology
Dates of Award: 8/1/17 – 7/31/21
Role: Principal investigator

Title: Use of GPM field campaign in-situ cloud measurements to evaluate precipitation retrieval assumptions
Granting Agency: NASA, Earth System Science graduate fellowship for Randy Chase
Dates of Award: 9/1/17 – 8/31/20
Amount: $140 K
Role: Principal investigator

Title: Using satellite-measured ocean vector winds to determine cold pool characteristics and their relationships to tropical convective variability
Granting Agency: NASA, Ocean Vector Winds Science Team
Dates of Award: 2/1/19 – 1/31/23
Amount: $625 K to SN
Role: Principal investigator (lead PI: Timothy J. Lang, NASA MSFC)

Title: Activities to improve CACTI data collection, quality, and utility
Granting Agency: DOE, Pacific Northwest National Laboratory
Dates of Award: 7/1/18 – 6/30/20
Amount: $200 K
Role: Principal investigator

Title: On-site support for Batelle G-1 research operations in CACTI
Granting Agency: DOE, Pacific Northwest National Laboratory
Dates of Award: 10/30/18 – 12/31/18
Amount: $11 K
Role: Principal investigator

Title: Radar tower for RELAMPAGO
Granting Agency: NSF, Physical and Dynamical Meteorology
Dates of Award: 8/1/18 – 7/31/19
Amount: $198 K
Role: Principal investigator

Title: RAPID: A scientific deployment of a C-Band radar to observe heavy precipitation and convective system dynamic processes in RELAMPAGO
Granting Agency: NSF, Physical and Dynamical Meteorology
Dates of Award: 8/1/18 – 7/31/19
Amount: $114 K
Role: Principal investigator

Title: Using GPM Ground Validation measurements for improved precipitation retrievals
Granting Agency: NASA
Dates of Award: 2/1/19 – 1/31/22
Amount: $450 K

Principal Investigator: Stephen W. Nesbitt

I. Review Panels (e.g. for Governmental Agencies, Educational Institutions)

Precipitation Measurement Missions, NASA, Aug 2006
CubeSat Missions, National Science Foundation, Jul 2008
CloudSat/CALIPSO Science Team, NASA, Feb 2010
The Science of Terra/Aqua, NASA, Aug 2010
Lawrence Berkeley National Labs Climate and Atmospheric Systems Research Focus Areas, DOE, Sept 2010
NASA Energy and Water cycle Study (NEWS), NASA, Dec 2011
Making Earth Science Data Records for Use in Research Environments (MEaSUREs), NASA, Aug 2012
CloudSat/CALIPSO Science Team, NASA, Jun 2013
GoAMAZON, Department of Energy, Sep 2013
The Science of Terra/Aqua, NASA, Sep 2013
The Atmospheric Composition Campaign Data Analysis and Modeling program, NASA, Jul 2014
The Earth Venture Instruments program, NASA, Sep 2015
Weather Program, NASA, Sep 2016
National Science Foundation Graduate Research Fellowship, Jan 2017
National Science Foundation Major Research Instrumentation, Apr 2017
Priority Programme Polarimetric Radar, Deutsche Forschungsgemeinschaft (DFG), German Sci. Fndtn., Jul 2018
Department of Energy Atmospheric Radiation Measurement Mobile Facility Program Review, Aug 2018

2. PUBLICATIONS AND CREATIVE WORKS

# Denotes any publication derived from a candidate's thesis
* Denotes any publication that has undergone stringent editorial review by peers
+ Denotes any publication that was invited and carries special prestige and recognition
_ Denotes any publication from a student or post-doctoral researcher advised or co-advised by S. Nesbitt

A. Doctoral thesis title

*Nesbitt, S. W., 2003: Precipitation features according to the Tropical Rainfall Measuring Mission. Ph.D. Dissertation, Dept. of Meteorology, University of Utah, Salt Lake City, UT 84112-0110, 182 pp.

B. Books authored or co-authored

Rauber, R. M., and S. W. Nesbitt, 2018: Radar meteorology, a first course. Wiley-Blackwell, 488 pp.

C. Articles in journals

1. Nesbitt, S. W., R. Zhang, and R. E. Orville, 2000: Seasonal and global NO_x production by lightning estimated from the Optical Transient Detector (OTD). *Tellus*, **52**, 1206-1215.
2. *#Nesbitt, S. W., E. J. Zipser, and D. J. Cecil, 2000: A census of precipitation features in the Tropics using TRMM: Radar, ice scattering, and lightning observations. *J. Climate*, **13**, 4087-4106.
3. *Cecil, D. J., E. J. Zipser, and S. W. Nesbitt, 2002: Reflectivity, ice scattering, and lightning characteristics of hurricane eyewalls and rainbands. Part I: Quantitative description. *Mon. Wea. Rev.*, **130**, 769-784.
4. *Toracinta E. R., D. J. Cecil, E. J. Zipser, and S. W. Nesbitt, 2002: Radar, passive microwave, and lightning characteristics of precipitating systems in the Tropics. *Mon. Wea. Rev.*, **130**, 802-824.
5. *Petersen, W. A., S. W. Nesbitt, R. J. Blakeslee, R. Cifelli, P. Hein and S. A. Rutledge, 2002: TRMM observations of convective regimes in the Amazon. *J. Climate*, **15**, 1278-1294.
6. *#Nesbitt, S. W., and E. J. Zipser, 2003: The diurnal cycle of rainfall and convective intensity according to three years of TRMM measurements. *J. Climate*, **16**, 1456-1475.
7. *Barros, A. P., G. Kim, E. Williams, and S. W. Nesbitt, 2004: Probing orographic controls in the Himalayas during the monsoon using satellite imagery. *Nat. Haz. and Earth Sys. Sci.*, **4**, 1-23.
8. *#Nesbitt, S. W., E. J. Zipser, and C. D. Kummerow, 2004: An examination of version 5 rainfall estimates from the TRMM microwave imager, precipitation radar, and rain gauges on global, regional and storm scales. *J. Appl. Meteor.*, **43**, 1016-1036.
9. *Cecil, D. J., S. J. Goodman, D. J. Boccippio, E. J. Zipser, and S. W. Nesbitt, 2005: Three years of TRMM precipitation features. Part I: Radar, radiometric, and lightning characteristics. *Mon. Wea. Rev.*, **133**, 543-566.
10. *Higgins, W., D. Ahijevych, J. Amador, A. Barros, E. H. Berbery, E. Caetano, P. Ciesielski, R. Cifelli, M. Cortez-Vazquez, A. Douglas, M. Douglas, G. Emmanuel, C. Fairall, D. Gochis, D. Gutzler, R. Johnson, C. King, T. Lang, M.-I. Lee, D. Lettenmaier, R. Lobato, V. Magaña, J. Meitin, K. Mo, S. Nesbitt, E. Pytlak, P.

Rogers, S. Rutledge, J. Schemm, S. Schubert, F. Torres, A. White, C. Williams, A. Wood, R. Zamora, C. Zhang, 2006: The North American Monsoon Experiment (NAME) field campaign and modeling strategy. *Bull. Amer. Meteor. Soc.*, **87**, 79-94.

11. *Matrosov, S., R. Cifelli, P. C. Kennedy, S. W. Nesbitt, V. N. Bringi. B. E. Martner, 2006: A comparative study of rainfall retrievals based on specific differential phase shifts at X- and S-band radar frequencies. *J. Atmos. Ocean. Tech.,* **23**, 952-963.
12. *Zipser, E. J., D. J. Cecil, C. Liu, S. W. Nesbitt, and D. P. Yorty, 2006, Where are the most intense thunderstorms on earth? *Bull. Amer. Meteor. Soc.*, **87**, 1057-1071.
13. *Nesbitt, S. W., R. Cifelli, and S. A. Rutledge, 2006: Storm morphology and rainfall characteristics of TRMM precipitation features. *Mon. Wea. Rev.*, **134**, 2702-2721.
14. *Liu, C., E. J. Zipser, and S. W. Nesbitt, 2007: Global distribution of tropical deep convection: Different perspectives using infrared and radar as the primary data source. *J. Climate*, **20**, 489-503.
15. *Lang, T. J., D. Ahijevych, S. W. Nesbitt, R. Carbone, and S. A. Rutledge: 2007: Radar-observed characteristics of precipitating systems during NAME 2004. *J. Climate*, **20**, 1713-1733.
16. *Cifelli, R., S. W. Nesbitt, and S. A. Rutledge, W. A. Petersen, and S. E. Yuter, 2007: Radar characteristics of precipitation features in the EPIC and TEPPS regions of the East Pacific. *Mon. Wea. Rev.*, **135**, 1576-1595.
17. *Liberman, R. S., D. M. Riggin, D. A. Ortland, S. W. Nesbitt, and R. A. Vincent, 2007: Variability of mesospheric diurnal tides and tropospheric diurnal heating during 1997-1998. *J. Geophys. Res.*, **112**, D20110, doi:10.1029/2007JD008578.
18. *Liu, C., E. J. Zipser, D. J. Cecil, S. W. Nesbitt, and S. Sherwood, 2008: A cloud and precipitation feature database from nine years of TRMM observations. *J. Appl. Meteor. Clim.*, **47**, 2712-2728.
19. *Cifelli, R., S. W. Nesbitt, and S. A. Rutledge, W. A. Petersen, and S. E. Yuter, 2008: Diurnal characteristics of precipitation features over the East Pacific: A comparison of the EPIC and TEPPS regions. *Mon. Wea. Rev.*, **21**, 4068-4086.
20. *Lyon, S. W., F. Domingues, D. J. Gochis, N. A. Brunsell, C. L. Castro, F. K. Chow, D. Fuka, Y. Hong, P. Kucera, S. W. Nesbitt, Y. Fan, N. Salzmann, J. Schmidli, P. K. Snyder, A. J. Teuling, T. E. Twine, S. Levis, J. D. Lundquist, G. D. Salvucci, A. M. Sealy, M. T. Walter, 2007: Coupling terrestrial and atmospheric water dynamics to improve prediction in a changing environment. *Bull. Amer. Meteor. Soc.*, **89**, 1275-1279.
21. *Nesbitt, S. W., D. J. Gochis, and T. J. Lang, 2008: The diurnal cycle of clouds and precipitation along the Sierra Madre Occidental during the North American Monsoon Experiment: Implications for precipitation estimation in complex terrain. *J. Hydromet.*, **9**, 728-743.
22. *Gochis, D. J., S. W. Nesbitt, W. Yu, and S. Williams, 2009: Comparison of gauge-corrected versus non-gauge corrected satellite-based quantitative precipitation estimates during the 2004 NAME Enhanced Observing period. *Atmosphera*, **22**, 69-98.
23. *Peters, O., J. D. Neelin, and S. W. Nesbitt, 2009: Mesoscale convective clusters as critical phenomena. *J. Atmos. Sci*, **66**, 2913-2924.
24. *Lang, T. J., S. W. Nesbitt, and L. D. Carey, 2009: On the correction of partial beam blockage in polarimetric radar data. *J. Atmos. Ocean Tech.*, **26**, 943-957.
25. *Nesbitt, S. W., and A. M. Anders, 2009: Very high resolution precipitation climatologies from the Tropical Rainfall Measuring Mission Precipitation Radar. *Geophys. Res. Lett.*, **36**, L15815, doi:10.1029/2009GL038026.
26. *Molthan, A., W. A. Petersen, S. W. Nesbitt, and D. Hudak, 2010: Evaluating the snow crystal size distribution and density assumptions within a single-moment microphysics scheme. *Mon. Wea. Rev.*, **138**, 4254–4267.
27. *Rickenbach, T. M., R. Nieto-Ferreira, R. P. Barnhill, and S. W. Nesbitt, 2011: Regional contrast of mesoscale convective system structure prior to and during monsoon onset across South America. *J. Climate*, **24**, 3753–3763.
28. *Harnos, D. J., and S. W. Nesbitt, 2011: Convective structure in rapidly intensifying tropical cyclones as depicted by passive microwave measurements. *Geophys. Res. Lett.* **38**, L07805, doi:10.1029/2011GL047010.
29. *Schiffer, N. J., and S. W. Nesbitt, 2012: Flow, moisture, and thermodynamic variability associated with Gulf of California surges within the North American Monsoon. *J. Climate*, **25**, 4220–4241.

Since promotion to associate professor at Illinois:

30. *McFarquhar, G. M., B. Jewett, M. A. Gilmore, S. W. Nesbitt, and T.-L. Hseih, 2012: Vertical velocity and microphysical distributions related to the rapid intensification of simulated Hurricane Dennis (2005). *J. Atmos. Sci.*, **69**, 3515–3534.
31. *Rickenbach, T. M., R. Nieto-Ferreira, R. P. Barnhill, and S. W. Nesbitt, 2013: Seasonal and regional differences in the rainfall and intensity of isolated convection over South America. *Int. J. Climatology,* **33**, 2002–2007.
32. *Williams, C. R., V. N. Bringi, L. Carey, V. Chandrasekar, P. Gatlin, Z. S. Haddad, W. A. Petersen, R.

Meneghini, S. J. Munchak, S. W. Nesbitt, W. A. Petersen, S. Tanelli, A. Tokay, A. Wilson, D. B. Wolff, 2014: Describing the Shape of Raindrop Size Distributions Using Uncorrelated Raindrop Mass Spectrum Parameters. *J. Appl. Meteor. Climatol.*, **53**, 1282–1296.

33. *Bagley, J. E., S. C. Davis, M. Georgescu, M. Z. Hussain, J. Miller, S. W. Nesbitt, A. VanLoocke, C. J. Bernacchi, 2014: The biophysical link between climate, water, and vegetation in bioenergy agro-ecosystems. *Biomass and Bioenergy,* **71**, 187–201.
34. *Yang, S., S. W. Nesbitt, 2014: Statistical properties of precipitation as observed by the TRMM precipitation radar. *Geophys. Res. Lett.*, **41**, 5636–5643.
35. *Anders, A. M, and S. W. Nesbitt, 2015: Altitudinal precipitation gradients in the tropics from Tropical Rainfall Measuring Mission (TRMM) precipitation radar. *J. Hydromet.*, **16**, 441-448.
36. *Skofronick-Jackson, G., D. Hudak, W. Petersen, S. W. Nesbitt, V. Chandrasekar, S. Durden, K. J. Gleicher, G.-J., Huang, P. Joe, P. Kollias, K. A. Reed, M. R. Schwaller, R. Stewart, S. Tanelli, A. Tokay, J. R. Wang, and M. Wolde, 2015: Global Precipitation Measurement Cold Season Precipitation Experiment (GCPEx): For measurement sake let it snow. *Bull. Amer. Meteor. Soc.,* **96**, 1719–1741.
37. *Fritz, C., Z. Wang, S. W. Nesbitt, and T. J. Dunkerton, 2016: Vertical structure and contribution of different types of precipitation during Atlantic tropical cyclone formation as revealed by TRMM PR, *Geophys. Res. Lett.*, **43**, doi:10.1002/2015GL067122.
38. *Jensen, M. E., W. A. Petersen, A. Bansemer, N. Bharadwaj, L. D. Carey, D. J. Cecil, S. M. Collis, A. D. Del Genio, B. Dolan, J. Gerlach, S. E. Giangrande, A. Heymsfield, G. Heymsfield, P. Kollias, T. J. Lang, S. W. Nesbitt, A. Neumann, M. Poellot, S. A. Rutledge, M. Schwaller, A. Tokay, C. R. Williams, D. B. Wolff, S. Xie, and E. J. Zipser, 2016: The Midlatitude Continental Convective Clouds Experiment (MC3E). *Bull. Amer. Meteor. Soc.*, **97**, 1667–1686.
39. *Harnos, D. S. and S. W. Nesbitt, 2016: Varied pathways for simulated tropical cyclone rapid intensification. Part I: Precipitation and environment. *Quart. J. Roy. Meteor. Soc.,* **142**, 1816-1831.
40. *Harnos, D. S. and S. W. Nesbitt, 2016: Varied pathways for simulated tropical cyclone rapid intensification. Part II: Vertical motion and cloud populations. *Quart. J. Roy. Meteor. Soc.,* **142**, 1832-1846.
41. *Harnos, D. S., and S. W. Nesbitt, 2016: Passive microwave observations of tropical cyclone inner-core cloud populations relative to subsequent intensity change. *Mon. Wea. Rev*., **144**, 4461-4482.
42. *Vidal, L., S. W. Nesbitt, P. V. Salio, C. Farias, G. M. Nicora, S. Osores, 2017: C-Band Dual-Polarization Observations of a Massive Volcanic Eruption in South America. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, **10**, 960-973.
43. *Mulholland, J., J. Frame, S. Nesbitt, S. Steiger, K. Kosiba, and J. Wurman, 2017: Observations of misovortices within a long lake-axis-parallel lake-effect snow band during the OWLES project. *Mon. Wea. Rev.*, **145**, 3265–3291.
44. *Trapp, R. J., G. Marion, and S. W. Nesbitt, 2017: The regulation of tornado intensity by updraft width. *J. Atmos. Sci.*, **74**, 4199–4211.
45. *Flynn, W. A., S. W. Nesbitt, and A. M. Anders, P. Garg, 2017: Mesoscale precipitation characteristics near the Western Ghats during the Indian Summer Monsoon as simulated by a high-resolution regional model. *Quart. J. Roy. Meteor. Soc.*, **143**, 3070–3084.
46. *Chase, R. C., J. A. Finlon, P. C. Borque, G. A. McFarquhar, S. W. Nesbitt, M. Poellot, S. Tanelli, 2018: Evaluation of triple-frequency radar retrieval of snowfall properties using coincident airborne in-situ observations during OLYMPEx. *Geophys. Res. Lett.*, **45**, 5752–5760.
47. *Mulholland, J., S. W. Nesbitt, R. J. Trapp, K. Rasmussen, and P. Salio, 2018: Convective modes, morphologies, and environments near the Sierras de Córdoba, Argentina. *Mon. Wea. Rev.*, **146**, 2541–2557.
48. Finlon, J. A., G. M. McFarquhar, S. W. Nesbitt, R. M. Rauber, H. Morrison, W. Wu, and P. Zhang, 2018: A novel approach to characterize the variability in mass-Dimension relationships of ice particles in clouds: results from MC3E. Accepted, *Atmos. Chem. Phys.*

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49. Borque, P. C., K. J. Harnos, S. W. Nesbitt, and G. McFarquhar, 2018: Uncorrelated mass parameters for improved size-distribution parameterization of ice particles. In review, *J. Appl. Meteor. Clim.*
50. Borque, P. C., S. W. Nesbitt, R. J. Trapp, and S. Lasher-Trapp, 2018: Relationship between convectively-generated cold pools and the microphysics of deep mid-latitude convection. In review, *Mon. Wea. Rev.*
51. Garg., P., S. W. Nesbitt, T. J. Lang, T. Chronis, 2018: Identifying tropical oceanic mesoscale cold pools using spaceborne scatterometer winds. In review, *J. Geophys. Res.-Atmos.*
52. Mulholland, J., S. W. Nesbitt, and R. J. Trapp, 2018: Upscale convective growth of an orogenic supercell into a mesoscale convective system in Argentina, South America. In review, *Mon. Wea. Rev.*

53. Tridon, F., A. Battaglia, R. J. Chase, F. Joseph Turk, J. Leinonen, S. Kneifel, K. Mroz, J. Finlon, A. Bansemer, S. Tanelli, A. J. Heymsfield, and S. W. Nesbitt: 2018: The microphysics of stratiform precipitation during OLYMPEx: compatibility between 3-frequency radar and airborne in situ observations. In review, *J. Geophys. Res.-Atmos.*

D. Bulletins, Reports or Conference Proceedings

1. #Cecil, D. J., D. B. Wolff, E. R. Toracinta, and S. W. Nesbitt, 1998: Multi-sensor comparison of TRMM satellite and ground validation products from Texas and Florida squall line events. Preprints, 19th Conf. Severe Local Storms, Minneapolis, MN, Amer. Meteor. Soc., 587-590.
2. #Nesbitt, S. W., 1999: A comparison of 85 GHz ice scattering, reflectivity structure and lightning observations of tropical precipitation by TRMM. Preprints, 23rd Conference on Hurricanes and Tropical Meteorology, Dallas, TX, Amer. Meteor. Soc., 939-942.
3. Nesbitt, S.W., Zipser, E. J., B. Xi, G. Heymsfield and R. Hood, 2000: Using radar profiles and passive microwave radiances as constraints for deriving microphysical profiles within cloud systems. Preprints, 13th International Conference on Clouds and Precipitation, Reno, NV, International Commission on Clouds and Precipitation, 250-253.
4. Yorty, D. P., E. J. Zipser, and S. W. Nesbitt, 2001: Global distribution of extremely intense storms between 36°S and 36°N using evidence from the TRMM radar. Preprints, 30th International Conf. on Radar Meteor., Munich, Germany, Amer. Meteor. Soc., 334-336.
5. Nesbitt, S. W. and G. V. Mota, 2002: A comparison of precipitation estimates in the Himalayas and Andes. Preprints, 10th Conference on Mountain Meteorology and MAP Meeting, Park City, UT, Amer. Meteor. Soc., 237-238.
6. Rutledge, S., S. Nesbitt, R. Cifelli, T. Lang, B. Martner, S. Matrosov, D. Kingsmill, K. Gage, C. Williams, V. Bringi, V. Chandrasekar, and P. Kennedy, 2005: Report and recommendations of the Global Precipitation Mission (GPM) Ground Validation (GV) Front Range Pilot Project. Report, submitted to NASA GPM Project Office, 67 pp.

E. Abstracts (since last promotion, 68 submitted prior to promotion to associate professor, omitted for space)

1. Nesbitt, S. W., A. VanLoocke, and C. J. Bernacchi, 2012: Biosphere-atmosphere interactions in the North American Monsoon, Water Workshop, Energy Biosciences Institute, Chicago, IL.
2. Nesbitt, S. W., K. J. Gleicher, A. Heymsfield, A. Bansemer, M. Polleot, A. Newman, S. Collis, P. Kollias, W. A. Petersen, 2012: Multiple-wavelength radar perspectives of mixed-phase convective precipitation in MC3E. European Radar Conference, Toulouse, France.
3. Nesbitt, S. W., K. J. Gleicher, W. A. Petersen, A. Bansemer, A. Heymsfield, M. Poellot, A. Newmann, D. Delene, G. Heymsfield, 2012: Radar-aircraft synergy in GPM-GV field campaigns. Oral presentation, Fall meeting, AGU, San Francisco, CA.
4. Gleicher, K. J., and S. W. Nesbitt, 2013: An evaluation of WRF microphysics using airborne and ground instrumentation in LPVEx for GPM-GV. Fall meeting, AGU, San Francisco, CA.
5. Harnos, D. S., and S. W. Nesbitt, 2013: Structural morphology of tropical cyclones as witnessed by passive microwave sensors. Annual meeting, AMS, Austin, TX.
6. Nesbitt, S. W., A. M. Anders, 2013: Precipitation, elevation and relief in the tropics. Annual meeting, AMS, Austin, TX.
7. Kaufeld, W. J., and S. W. Nesbitt, 2013: Influence of soil moisture initialization on local precipitation patterns in the Western Ghats. Oral presentation, Annual meeting, AMS, Austin, TX.
8. Schiffer, N. S., and S. W. Nesbitt, 2013: Does increased model resolution over complex terrain improve precipitation for the right reasons? A North American Monsoon case study. Oral presentation, Annual meeting, AMS, Austin, TX.
9. Nesbitt, S. W., 2013: Building the GV column: physical validation of GPM algorithms. Invited presentation, NASA Precipitation Measurement Missions science team meeting, Annapolis, MD.
10. Nesbitt, S. W., 2013: Building the GV column in the GPM Cold Season Precipitation Experiment (GCPEX). Invited poster, NASA Precipitation Measurement Missions Science Team Meeting, Annapolis, MD.
11. Nesbitt, S. W., G. Duffy, G. McFarquhar, M. Kulie, C. V. Chandra, P. Kollias, S. Tanelli, W. A. Petersen, and A. Tokay, 2013: Quantifying snowfall scattering and microphysical properties from the Global Precipitation Mission Cold season Precipitation Experiment (GCPEx). Oral presentation, 36th Conference on Radar Meteorology, AMS, Breckenridge, CO.
12. Keeler, J. M, B. F. Jewett, R. M. Rauber, G. M. McFarquhar, A. A. Rosenow, D. M. Plummer, D. Leon, S. W. Nesbitt, R. M. Rasmussen, G. Thompson, L. Xue, and C. Liu, 2014: Comparisons of Wyoming Cloud Radar observations to simulations of precipitation generating cells in winter cyclones. Abstract, 36th Conference on

Radar Meteorology, AMS, Breckenridge, CO.
13. Nesbitt, S. W., G. A. Duffy, K. Gleicher, G. M. McFarquhar, M. Kulie, C. R. Williams, W. A. Petersen, S. J. Munchak, A.Tokay, G. Skofronick-Jackson, V. Chandrasekar, P. Kollias, D. R. Hudak, S. Tanelli, 2013: Building the GPM-GV column from the GPM Cold season Precipitation Experiment. Invited oral presentation, AGU Fall Meeting, San Francisco, CA.
14. Duffy, G., S. W. Nesbitt, G. McFarquhar, M. Poellot, V. Chandrasekar, D. Hudak, 2013: In situ microphysical and scattering properties of falling snow in GPM-GCPEx. Oral presentation, AGU Fall Meeting, San Francisco, CA.
15. Gleicher, K., S. W. Nesbitt, G. Duffy, G. McFarquhar, A. Bansemer, A. Heymsfield, W. A. Petersen, 2013: Evaluating relationships between particle size distribution parameters and environment from GCPEx. Fall meeting, AGU Fall Meeting, San Francisco, CA.
16. Colle, B. E., A. Molthan, R. Yu, S. E. Yuter, and S. W. Nesbitt, 2013: Evaluation of model microphysics within precipitation bands of extratropical cyclones. AGU Fall Meeting, San Francisco, CA.
17. Harnos, D. S., and S. W. Nesbitt, 2013: Evaluation of vertical motion contributions towards tropical cyclone rapid intensification under varying wind shear. AGU Fall Meeting, San Francisco, CA.
18. Reed, K. A., S. W. Nesbitt, M. Kulie, T. S. L'Ecuyer, and N. Wood, 2013: An evaluation of satellite retrievals of snowfall in regions of complex terrain. AGU Fall Meeting, San Francisco, CA.
19. Wang, Z., I. E. Hankes, S. M. Hristova-Veleva, T. J. Dunkerton, and S. W. Nesbitt, 2014: Characteristics of tropical easterly wave pouches during tropical cyclone formation. 31st Conference on Hurricanes and Tropical Meteorology, San Diego, CA.
20. Harnos, D. S., and S. W. Nesbitt, 2014: Characterization of the dynamical role of convection in two simulated episodes of rapid intensification. Oral presentation, 31st Conference on Hurricanes and Tropical Meteorology, San Diego, CA.
21. Harnos, D. S., and S. W. Nesbitt, 2014: Passive microwave signatures of tropical cyclone symmetry as related to intensity change. 31st Conference on Hurricanes and Tropical Meteorology, San Diego, CA.
22. Duffy, G., S. W. Nesbitt, and G. McFarquhar, 2014: Evaluations of radar scattering models for falling snow. Precipitation Measurement Missions Science Team Meeting, NASA, Baltimore, Maryland.
23. Gleicher, K., S. W. Nesbitt, K. Reed, A. Bansemer, A. Heymsfield, and W. Petersen, 2015: Evaluating Relationships between Particle Size Distribution Parameters from GCPEx. Precipitation Measurement Missions Science Team Meeting, NASA, Baltimore, Maryland.
24. Nesbitt, S. W., P. Salio, D. Cecil, R. Garreaud, R. Houze, Jr., K. Rasmussen, A. Varble, L. Machado, D. Gochis, and S. Goodman, 2014: RELAMPAGO and SAME-PACE: Extreme storms that impact society in Southeastern South America. World Weather Open Science Conference, World Meteorological Organization, Montréal, Canada.
25. Nesbitt, S. W., K. Gleicher, G. Duffy, K. Reed, V. Chandrasekar, W. Petersen, D. Hudak, 2014: Snowfall validation for the NASA Global Precipitation Measurement mission. 8th European Conference on Radar Meteorology and Hydrology, Garmisch-Partenkirchen, Germany.
26. Harnos, K., S. W. Nesbitt, K. Reed, G. Duffy, C. Williams, A. Bansemer, S. Munchak, A. Heymsfield, W. Petersen, 2014: Comparison of airborne and ground based measurements and the relationships between microphysical parameters from GCPEx. AGU Fall Meeting, San Francisco, CA.
27. Choi, S., S. W. Nesbitt, T. Lang, and T. Chronis, 2014: Influence of Mesoscale Ocean Wind Variability on Tropical Atmospheric Convection. AGU Fall Meeting, San Francisco, CA.
28. Nesbitt, S. W., D. S. Harnos, K. Harnos, K. Reed, G. Duffy, G. McFarquhar, S. Tanelli, C. Williams, B. Johnson, W. Petersen, A. Tokey, A. Barros, A. Wilson, 2014: Constraints on a priori assumptions and microphysical properties in precipitation from in situ measurements in GPM-GV field campaigns: regime dependence and impact on retrievals. AGU Fall Meeting, San Francisco, CA.
29. Colle, B., A. Molthan, R. Yu, and S. W. Nesbitt, 2014: Evaluation of Mixed-Phase Microphysics Within Winter Storms Using Field Data and In Situ Observations. AGU Fall Meeting, San Francisco, CA.
30. Barros, A., W. Petersen, T. Lang, A. Wilson, Y. Duan, S. W. Nesbitt, R. Cifelli, M. Schwaller, D. Wolff, D. Miller, J. Gourley, M. Petters, 2014: IPHEx 2014: Observations of Orographic Precipitation Processes in the Southern Appalachians. AGU Fall Meeting, San Francisco, CA. (invited)
31. Reed, K., S. W. Nesbitt, and A. Tokay: 2014: An Evaluation Of Cold Season Precipitation Microphysical Properties From A Ground-Based Perspective. AGU Fall Meeting, San Francisco, CA.
32. Kulie, M., S. W. Nesbitt, D. S. Harnos, A. Heymsfield, B. Johnson, S. Tanelli, 2014: Multi-Frequency Radar and Microwave Radiometer Simulations of Surface Snowfall Events from GCPEx: Synergistic Application of In-Situ Microphysics Observations with Modeled Ice Scattering Properties. AGU Fall Meeting, San Francisco, CA.
33. Duffy, G., S. W. Nesbitt, and G. McFarquhar, 2014: Evaluations of Particle Scattering Models for Falling Snow.

AGU Fall Meeting, San Francisco, CA.

34. Nesbitt, S. W., 2015: Improving Cold Season Precipitation Retrievals with GPM Ground Validatation Data. 7th NASA Global Precipitation Measurement Ground Validation Workshop, Seoul, Korea. (invited)
35. Nesbitt, S. W., 2015: RELAMPAGO: Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations. Invited Conference Keynote Presentation, XII Argentine Congress on Meteorology, Mar del Plata, Argentina.
36. Nesbitt, S. W., P. Salio, A. C. Saulo, 2015: RELAMPAGO Field Campaign. XII Argentine Congress on Meteorology, Mar del Plata, Argentina. (invited)
37. Ruiz, J. J., L. Vidal Sr., P. Maldonado, S. Suarez Ruiz, P. Salio, Y. Garcia Skabar, Y. Garcia Skabar, A. C. Saulo, S. W. Nesbitt, E. Kalnay, and T. Miyoshi, 2016: Local ensemble transform Kalman filter experiments using radar observations: a case study over central Argentina. 37th Conference on Radar Meteorology, AMS, Norman, OK.
38. Vidal, L. Sr., S. W. Nesbitt, P. Salio, S. Osores, C. Farias, A. Rodriguez, J. Serra, and G. Caranti, 2015: C-Band Dual-Polarization Observations of a Massive Volcanic Eruption in South America. 37th Conference on Radar Meteorology, AMS, Norman, OK.
39. Salio, P. V., and L. Pappalardo, S. W. Nesbitt, L. Vidal Sr., M. D. L. M. Alvarez Imaz, and A. Scardilli, 2015: Variability of parameters for Attenuation Correction over mid-latitude extreme precipitating events. 37th Conference on Radar Meteorology, AMS, Norman, OK.
40. Nesbitt, S. W., G. Duffy, K. A. Reed, G. McFarquhar, and A. Tokay, 2015: Using particle size distribution observations from GPM field campaigns to constrain spaceborne precipitation retrievals. 37th Conference on Radar Meteorology, AMS, Norman, OK.
41. Vidal, L. Sr., S. R. Suarez, P. Salio, S. W. Nesbitt, and R. Mezher, 2015: S. Ruiz Suarez, P. Salio, S. W. Nesbitt, and R. Mezher, 2015: C-band Hydrometeor Classification Scheme and Its Application on Hail Detection over Central Argentina. 37th Conference on Radar Meteorology, AMS, Norman, OK.
42. Duffy, G., S. W. Nesbitt, and G. McFarquhar, 2015: A Comparison of Retrieved Mass-Diameter Relationships in Snowfall from Radar and Ice Water Content Measurements. 37th Conference on Radar Meteorology, AMS, Norman, OK.
43. Metzler, R., S. W. Nesbitt, and P. Salio, 2015: Investigating Hail Core Signatures Using C-Band Polarimetric Radar. 37th Conference on Radar Meteorology, AMS, Norman, OK.
44. Reed, K. A., and S. W. Nesbitt, 2015: An Evaluation of Cold Season Precipitation Microphysical Properties from a Radar Perspective. 37th Conference on Radar Meteorology, AMS, Norman, OK.
45. Nesbitt, S. W., and K. L. Rasmussen, 2015: Extremely tall convection: characteristics and controls. AGU Fall Meeting, San Francisco, CA.
46. Duffy, G. A., S. W. Nesbitt, and G. M. McFarquhar, 2015: Sensitivity of simulated snow cloud properties to mass-diameter parameterizations. AGU Fall Meeting, San Francisco, CA.
47. Fritz, C., Z. Wang, S. W. Nesbitt, and T. Dunkerton, 2015: Cloud Evolution during Tropical Cyclone Formation as Revealed by TRMM PR. AGU Fall Meeting, San Francisco, CA.
48. Reed, K. A., and S. W. Nesbitt, 2015: An uncertainty model for snowfall rate retrievals from the GPM DPR. AGU Fall Meeting, San Francisco, CA.
49. Nesbitt, S. W., and A. Varble, 2016: CACTI-RELAMPAGO synergy. Atmospheric Radiation Measurement Radar Meeting, Miami, FL. (invited)
50. Lang, T. J., S. W. Nesbitt, P. Garg, G. Priftus, and T. Chronis, 2016: Using scatterometer-measured vector winds to study high-impact weather events. NASA Ocean Vector Winds Science Team Meeting, Sapporo, Japan. (invited)
51. Nesbitt, S. W., and A. Varble, 2016: CACTI-RELAMPAGO synergy. Atmospheric Radiation Measurement Atmospheric Systems Research Science Team Meeting, Tysons, VA. (invited)
52. Nesbitt, S. W., P. Borque, K. Rasmussen, P. Salio, R. J. Trapp, L. Vidal, M. Rugna, J. Mulholland, 2016: Severe Convection in Central Argentina: Storm Modes and Environments. 28th Conference on Severe Local Storms, AMS, Portland, OR.
53. Nesbitt, S. W. and P. Borque, 2017: RELAMPAGO. Atmospheric Radiation Measurement Atmospheric Systems Research Science Team Meeting, Tysons, VA. (invited)
54. Garg, P., S. W. Nesbitt, T. J. Lang, 2017: Using scatterometer-measured vector winds to study high-impact weather events. NASA Ocean Vector Winds Science Team Meeting, San Diego, CA (invited)
55. Nesbitt, S. W., R. Chase, P. Borque, J. Finlon, S. Ding, and G. McFarquhar, 2017: A critical evaluation of the GPM DPR algorithm assumptions using OLYMPEX data, OLYMPEX Workshop, Seattle, WA. (invited)
56. Nesbitt, S. W., K. Rasmussen, M. Cancelada, P. Salio, L. Vidal, J. Mulholland, P. Borque, R. J. Trapp, 2017: Storm environments supporting spaceborne radar and GOES-observed severe storms in Central Argentina. 37th Conference on Radar Meteorology, AMS, Chicago, IL.

57. Nesbitt, S. W., P. Borque, R. Chase, and G. McFarquhar, 2017: Using GV Field Campaign Data to Improve GPM Algorithm Assumptions. Poster, NASA Precipitation Science Team Meeting, San Diego, CA.
58. Nesbitt, S. W., R. Chase, P. Borque, J. Finlon, and G. McFarquhar, 2017: Evaluation of GPM algorithm assumptions using GPM-GV data, NASA Precipitation Science Team Meeting, San Diego, CA. (invited)
59. Nesbitt, S. W., and coauthors: 2017: Improving high impact weather and climate prediction for societal resilience in Subtropical South America: Proyecto RELAMPAGO-CACTI. AGU Fall Meeting, New Orleans, LA. (invited)
60. McFarquhar, G. M., J. Finlon, S. W. Nesbitt, P. Borque, R. Chase, W. Wu, H. Morrison, and M. Poellot, 2017: A framework for characterizing how ice crystal size distributions, mass-dimensional and area-dimensional relations vary with environmental and aerosol properties. AGU Fall Meeting, New Orleans, LA. (Invited)
61. Garg, P., S. W. Nesbitt, T. J. Lang, and T. Chronis, 2017: Observed structure and characteristics of cold pools over tropical oceans using vector wind retrievals and WRF simulations. AGU Fall Meeting, New Orleans, LA.
62. P. Borque, J. Finlon, S. W. Nesbitt, G. M. McFarquhar, 2017: Characterization of ice and snow in-situ properties during the main weather regimes observed in the Olympic Mountain Experiment. . AGU Fall Meeting, New Orleans, LA.
63. Borque, P. C., S. W. Nesbitt, and G. M. McFarquhar, 2018: Analysis of cold pools' morphology and thermodynamics in connection with associated convective clouds strength and microphysics evolution. AMS Annual Meeting, Austin, TX.
64. Nesbitt, S. W., and coauthors: 2018: Understanding Processes and Improving Predictions of Hydrometeorological Extremes: Proyecto RELAMPAGO-CACTI. AMS Annual Meeting, Austin, TX.
65. Mulholland, J., S. W. Nesbitt, R. J. Trapp, and K. L. Rasmussen, 2018: Factors Controlling Convective Storm Mode and Heavy Rainfall Production Near the Sierras De Córdoba, Argentina. AMS Annual Meeting, Austin, TX.
66. Flynn, W. J., S. W. Nesbitt, and P. Garg, 2018: On the Diurnal Cycle of Rainfall Near the Western Ghats during the Indian Summer Monsoon: Influences of the Low-Level Atmosphere and Land Surface. AMS Annual Meeting, Austin, TX.
67. Borque, P., and S. W. Nesbitt, 2018: RELAMPAGO overview, synergy with CACTI. Department of Energy Atmospheric Radiation Measurement Principal Investigator Meeting and Atmospheric Radiation Measurement Climate Research Facility Users' Meeting. Tysons, VA.
68. Nesbitt, S. W., P. Borque, R. Chase, J. Finlon, and G. M. McFarquhar, 2018: Towards improved spaceborne ice and mixed-phase spaceborne precipitation retrievals. NASA Precipitation Measurement Missions Science Team Meeting, Phoenix, Arizona.
69. Chase, R., S. W. Nesbitt, P. Borque and G. M McFarquhar, 2018: Multi-sensor investigation of large ice particles using GPM and NASA GV Data. NASA Precipitation Measurement Missions Science Team Meeting, Phoenix, Arizona.

3. RESIDENT INSTRUCTION

A. Summary of Instruction

1. Descriptive Data

Term	Offer-ing Dept	Course---		Section-		Indiv Instr /Class	IUs	Stu-dents	Class Contact Hours	# of Instr-uctors
SP07	1-253	ATMS	403	LCD	A	C	72	18	5	1
SU07	1-253	ATMS	590	IND	SWN	I	6	1	1	1
FA07	1-253	ATMS	403	LCD	0	C	44	11	5	1
FA07	1-253	ATMS	591	CNF	A	C	172	43	1	1
FA07	1-253	ATMS	590	IND	SWN	I	6	1	0	1
SP08	1-253	ATMS	591	CNF	A	C	164	41	1	1
SP08	1-253	ATMS	406	LCD	A	C	68	17	3	1
SU08	1-253	ATMS	590	IND	SWN	I	6	1	0	1
FA08	1-253	ATMS	410	LCD	A	C	72	18	3	1
FA08	1-253	ATMS	590	IND	SWN	I	8	1	0	1
FA08	1-253	ATMS	599	IND	SWN	I	8	1	0	1
SP09	1-253	ATMS	599	CNF	SN	C	8	1	3	1

SP09	1-253	ATMS	505	LCD	A	C	36	9	3	1
FA09	1-253	ATMS	406	LEC	0	C	48	12	3	1
FA09	1-253	ATMS	599	IND	SWN	I	18	3	0	1
SP10	1-253	ATMS	599	CNF	SN	C	8	2	3	1
SP10	1-253	ATMS	505	LCD	A	C	48	12	3	1
SU10	1-253	ATMS	599	IND	SWN	I	26	4	0	1
FA10	1-253	ATMS	597	LCD	R	C	84	21	3	1
FA10	1-253	ATMS	599	IND	SWN	I	29	4	0	1
SP11	1-253	ATMS	599	CNF	SN	C	30	5	4	1
SP11	1-253	ATMS	505	LCD	A	C	16	4	3	1
SU11	1-253	ATMS	599	IND	SWN	I	38	6	0	1
FA11	1-253	ATMS	406	LEC	A	C	52	13	3	1
FA11	1-253	ATMS	599	IND	SWN	I	40	5	15	1
SP12	1-253	ATMS	599	CNF	SN	C	40	4	4	1
SP12	1-253	ATMS	505	LCD	A	C	28	7	3	1
SU12	1-253	ATMS	599	IND	SN	I	30	5	4	1
FA12	1-253	ATMS	411	LCD	A	C	52	13	3	1
FA12	1-253	ATMS	571	LEC	A	C	6	6	1	1
FA12	1-253	ATMS	599	IND	SWN	I	32	4	13	1
SP13	1-253	ATMS	599	CNF	SN	C	31	4	12	1
SP13	1-253	ATMS	505	LCD	A	C	32	8	3	1
SU13	1-253	ATMS	599	IND	SWN	I	28	4	2	1
FA13	1-253	ATMS	571	LEC	A	C	13	13	1	1
FA13	1-253	ATMS	599	IND	SWN	I	48	6	14	1
SP14	1-253	ATMS	597	LEC	SN	C	66.2	17	3	1
SP14	1-253	ATMS	505	LCD	A	C	48	12	3	1
SP14	1-253	ATMS	599	CNF	SN	C	44	5	12	1
SP14	1-253	ATMS	490	IND	SN	I	1	1	4	1
SU14	1-253	ATMS	599	IND	SWN	I	28	4	2	1
FA14	1-253	ATMS	406	LEC	A	C	56	14	3	1
FA14	1-253	ATMS	571	LEC	A	C	10	10	1	1
FA14	1-253	ATMS	599	IND	SWN	I	40	4	8	1
SP15	1-253	ATMS	599	CNF	SN	C	32	4	12	1
SP15	1-253	ATMS	590	IND	SWN	I	4	1	0	1
SU15	1-253	ATMS	599	IND	SWN	I	20	3	4	1
FA15	1-253	ATMS	391	LCD	SN	C	40.5	13.5	1	2
FA15	1-253	ATMS	599	IND	SWN	I	20	2	9	1
SP16	1-253	ATMS	599	CNF	SN	C	1	1	12	1
SP16	1-253	ATMS	597	LEC	SN	C	20	5	3	1
SU16	1-253	ATMS	599	IND	SWN	I	6	1	4	1
FA16	1-253	ATMS	406	LEC	A	C	32	8	3	1
FA16	1-253	ATMS	599	IND	SWN	I	7	2	10	1
SP17	1-253	ATMS	305	LEC	1	C	64.5	21.5	1	2
SP17	1-253	ATMS	599	IND	SN	I	8	2	5	1
SU17	1-253	ATMS	599	IND	SWN	I	18	3	11	1
FA17	1-253	ATMS	599	IND	SWN	I	31	4	10	1
SP18	1-253	ATMS	305	LEC	1	C	42	14	1	2
SP18	1-253	ATMS	590	IND	SWN	I	2	1	0	1
SP18	1-253	ATMS	599	IND	SN	I	20	3	5	1
SU18	1-253	ATMS	590	IND	SWN	I	4	1	0	1
SU18	1-253	ATMS	599	IND	SWN	I	18	3	11	1

2. Supervision of graduate students

M.S. Students Supervised

Kaufeld/Flynn, Wendilyn M.S., 2010, continued to PhD in our department
Schiffer, Nicole M.S., 2010, continued to PhD in our department

Harnos, Daniel	M.S., 2010, continued to PhD in our department
Brown, Patrick	M.S., 2010, currently employed at Energy Resources Center
Reed, Kimberly	M.S., 2011, continued to PhD in our department
Duffy, George	M.S. 2016, now a PhD student at Vanderbilt University
Choi, Lina	M.S. 2016 (received NSF Graduate Fellowship Fall 2015), now a PhD student at Aalborg University, Denmark
Chase, Randy	M.S., 2018, continued to PhD in our department
Zea, Lina Rivelli	M.S. student, 2017 – present

Ph.D. Students Supervised

Kaufeld/Flynn, Wendilyn	2012: "Land surface and orographic controls on precipitation patterns in the Sierra Madre Occidental and Western Ghats", Currently employed as an associate professor of earth sciences at the University of Northern Colorado.
Schiffer, Nicole	2013: "Intraseasonal precipitation processes in complex terrain: The effects of model and terrain resolution on WRF simulations of the North American Monsoon." Currently employed a science writer at the National Center for Supercomputing Applications.
Harnos, Daniel	2014, "Characterization of the role of precipitation in tropical cyclone intensification", Currently employed at NOAA Climate Prediction Center.
Gleicher/Harnos, Kirstin	2014, "Parametrizing PSD assumptions for GPM algorithms", Currently employed at NOAA Climate Prediction Center.
Reed, Kimberly	2009 – present, Passed Qualification Exam May 2013 (received NASA Earth System Science Graduate Fellowship Fall 2011)
Mulholland, Jake	2016 – present, passed preliminary exam in 2017
Garg, Piyush	2016 – present, passed preliminary exam in 2017
Singh, Itinderjot	2018 – present, passed preliminary exam in 2018
Cancelada, Maite	(co-Advised) 2016 – present, Universidad de Buenos Aires, Argentina
Chase, Randy	2018 – present (received NASA Earth System Science Graduate Fellowship Fall 2017)

Graduate Examination Committees
2007: Grim, Joseph (Ph.D.)
2008: Zhang, Henian (Ph.D.), Romine, Glen (Ph.D.)
2009: Um, Junshik (Ph.D)
2012: Van Loocke, Andrew (Ph.D)
2013: Barman, Rahul (Ph.D.), Ching, Joseph(Ph.D.)
2014: Mills, Catrin (Ph.D.), Hankes, Isaac (Ph.D.)
2015: Alvarez Imaz, Milagros (Licenciatura, Universidad de Buenos Aires, Argentina), Keeler, Jason (Ph.D.), Anselmo, Evandro (Ph.D., Universidade de São Paulo, Brazil), Grazioli, Jacopo (Ph.D., École Polytechnique Fédérale de Lausanne, Switzerland)
2016: Tian, Jian (Ph.D.), Rosenow, Andrew (Ph.D.)
2017: Fritz, Cody (Ph.D.), Wu, Wei (Ph.D., 2017)
2018: Hu, Huancui (Ph.D.)
ABD students: Finlon, Joseph, Curtis, Jeffrey

3. Supervision of Undergraduate Students (*capstone, +undergraduate researcher)
2009: Akers, Roger+
2011: Sulski, Katie*, Mycyk, Nicolas *
2012: Ventimiglia, Thomas*, Gacek, Zaneta+
2013: Ortiz, Ana*, Ewing, Gabriel+
2015: Carter, Lauren*, Gaggiano, Stephen*
2017: Soch, Carson*, Shackelton, James*, O'Shea, Brian*, Mandruccolo, Justin*, Grande, Anthony*
2018: Ross, Tobias*, Chung, Brian+

4. Other contributions to instructional programs

I have just finished co-authoring a textbook with Illinois atmospheric sciences professor Robert M. Rauber entitled, *Radar Meteorology, a First Course*, (488 pp., published by *Wiley-Blackwell*); it was published in 2018. It is the first radar meteorology book written in a didactic method, including homework questions, to cover all aspects of ground, airborne, and spaceborne radar, and the use of radar for research and in meteorological applications at an introductory level.

I have been deeply involved in the growth and maturity of the atmospheric sciences undergraduate major that began awarding degrees in 2009. I have served on the Department's curriculum committee for all but 3 years of my 12 years on the faculty, leading the committee from 2012-2015. As part of my service, I streamlined the undergraduate capstone course, expanded major mathematics requirements for majors, and included additional computational courses in the major. I have also been working to help align learning outcomes in our courses with Illinois Campus Student Learning Outcomes. I also taught several independent study courses in addition to my regular teaching load, and have advised 13 students in their ATMS 492 Capstone Undergraduate Research course.

I have played a major role in the inclusion of modern computational and data science undergraduate courses in the Department. As a result of the Fall 2014 department curriculum retreat, I developed two new courses, ATMS 205 Introduction to Computational Geosciences and ATMS 305 Computing and Data Analysis. These courses use modern computing languages including cutting-edge *python* data science tools with the common learning goal to improve students' ability to perform quantitative analyses and predictions using commonly used datasets in our field. These courses have been popular with atmospheric sciences majors as well as other majors on campus (with registration and wait lists exceeding the capacity of each computer classroom in which it has been taught). Course material similar to, but more advanced than that in ATMS 305, is under development so that in Spring Semester 2019, it will be introduced as an online graduate course that will form a core course in a new atmospheric sciences-led online master's degree program in climate, risk, and data science.

At the graduate level, I have contributed to teaching the Department's ATMS 571 Professional Development course in Fall 2012, 2013, and 2014, in addition to the regular teaching load. I expanded the curriculum of this course to include additional lecture materials about research ethics as well as designing an academic curriculum vitae and professional academic web site.

5. Candidate's Teaching Activities Report and Self-Review

The most rewarding part of my job as a teacher and scholar at the University of Illinois is working with the bright students our university attracts. Our atmospheric sciences major has undergone tremendous growth, and it has been exciting to be part of the crescendo of expansion and diversity that our teaching faculty has developed. I have contributed to this effort both in the classroom and in the improvement of our department's teaching mission through service to the Department and the College. I have been excited to help bring advanced computational skills to students in our major, School, and College. Under my leadership on our department's curriculum committee, we have redesigned our computational course series to develop student programming and problem-solving skills. I developed ATMS 305 (described below) as part of this program, and I look forward to playing a major role in developing a new computationally-based online master's degree program within our department. My courses and teaching style emphasize these skillsets. Given the increasing importance of science communication, my teaching style has evolved to emphasize visual, written, and oral communication skills. My courses emphasize hands-on learning and applying theory to practice; they are contained within every assignment or assessment that I give. I have taught nine different courses in my twelve years at the University; specific activities related to the three most recently taught courses are detailed below.

ATMS 305: Computing and Data Analysis. This course has been a required course taught in the department every semester since the revision of the department's computing curriculum in Fall 2014. It focuses on developing the students' coding and problem-solving abilities, skills required for careers in geosciences, as well as emerging career opportunities at the intersection of atmospheric sciences and data science. This course has had very high enrollment, with waiting lists exceeding the capacity of each classroom in which we have offered the course. The students are engaged in my problem-solving teaching methods, which include a combination of short lectures, in-class exercises using cloud-based *Jupyter notebooks*, homework exercises, and weekly open-note quizzes. Extensive office hours and online chat sessions using *Slack* ensure that students have the opportunity to master the skills covered each week. A final group project gives students the opportunity to work together to solve a real-world problem in the geosciences. It consists of writing an abstract of the problem and goals of the project, in-class feedback on results and pitfalls, and a final 15-minute presentation of the results of their investigation.

A coding problem is introduced each week centered, around a task and a dataset that can be used to help in the completion of that task. For example, one project uses hourly bicycle count data and weather data from a period of several years in Seattle, Washington to develop a multiple linear regression model to analyze and predict how the frequency of bicycle riders on a given day is affected by the weather. Through this exercise, students learn how to read data of various formats, visualize the data to understand underlying trends and variable interrelationships, and then develop and apply an underlying model that can quantitatively predict how these variables and uncertainties in the model parameters interact. Twelve modules covering commonly applied workflows in the geosciences comprise the course, such that students gain experience applying a variety of techniques and expand their computational "toolkit" in the process.

Given the relevance of the course and the modular design of the lectures, the course is adaptable to online teaching, and I am planning to expand the modules to graduate level problems and include them in a core course in the Department's proposed online master's degree program.

ATMS 597: Mesoscale Simulation with the Weather Research and Forecasting Model. This hands-on lecture course, which I first developed and taught in Fall 2010, has since seen significant enrollment as a special topics graduate-level course in atmospheric sciences. The Weather Research and Forecasting (WRF) model is the most widely used regional weather prediction model in the world. The course has several learning goals ranging from the theory of computational weather simulation and prediction to practical uses of the model on supercomputing hardware for weather forecasting and the simulation of weather phenomena. The course has always been granted an educational computer time grant from the National Science Foundation's Extreme Science and Engineering Discovery Environment (XSEDE). Students gain experience using this computational environment that either is, or is very similar to, the environment where students will run the model in their research. The course is unique in that much of the theory and technique developed there can be directly used in the students' theses and publications. Course projects have led directly to at least one journal publication, and indirectly to others as students conducted subsequent research with the model.

In the first part of the course, I present the theoretical underpinning of the model's mathematical and computational framework. Teaching modules are designed to explore the various components of the model. In-class exercises are designed to demonstrate the theoretical construction and assumptions within the model, and how to perform careful intercomparisons of model runs to examine how simulations change based on these assumptions. In this way, students build confidence about producing reproducible results and understand the sensitivity of model simulations based on changes to the model configuration. Students then design an instructor-approved mid-term independent project. The project requires a 5-page paper and a 15-minute oral presentation of their findings to help develop their communication skills.

In the second part of the course, students are led through application of the WRF model for forecasts and simulations by initializing the model with real weather data (not idealized cases). Here, I require students to perform diagnostic calculations and visualization of the model output using the *python* programming language. Similar to the mid-term project, an additional project is assigned, that summarizes the scientific approach and results of the science questions examined with their model simulations.

ATMS 406: Tropical Meteorology. This lecture course was a new course I developed for our department in Spring 2008; it is intended for graduate students and advanced undergraduate students within the department and in other geosciences departments. It introduces the classic literature as well as newer research on topics such as tropical cyclones, monsoons, El Niño/La Niña, the general circulation and energetics of the tropical atmosphere, and tropical wave theory. The goal of the course is to have the students apply their knowledge of basic atmospheric dynamics and physics to phenomena observed in the Tropics, since most of the coursework up to the point has been based upon mid-latitude dynamics. Since my promotion, I have introduced computational methods into the course using python, for example, to do thermodynamic calculations in a mature tropical cyclone, comparing observations to the "Carnot Cycle" theory.

I assembled the lectures and reading material from a wide breadth of literature and selected textbooks since no appropriate textbook currently is published. The students are assigned several homework assignments that vary significantly in type, applying both the principles of active and guided learning in various assignments. Pencil and paper problems are given, as well as computational assignments that involve topics such as running simple models intended to show feedbacks and influences on the radiative-convective equilibrium observed in the tropics, simple hurricane models, as well as the impacts of observable quantities (such as sea surface temperature) on hurricane intensity. A semester project involves selecting a topic of appropriate scope, performing a literature search (allowing students to learn to gather resources from journals), writing a high-quality technical review paper, and making appropriate citations to the literature. Students then give a 15-minute presentation on the topic of their review paper.

I plan to teach the course again in Fall 2019, and look to continually improve the course as well as take advantage of the Atlantic hurricane season as a real time learning activity.

Graduate Supervision. Even before arriving at Illinois, I began mentoring students in both my graduate career and postdoctoral position. I have learned to cultivate comfortable student interactions in an open, straightforward fashion. I give my students freedom to pursue their research independently, but also prevent them from excessively "spinning their wheels" on difficult problems. We have formal "sub-group" meetings once a week among the students working on similar topics, though students are encouraged to drop in or email when they have questions. We also have meetings of my entire research group once per month where overarching issues in the lab are discussed, and each student presents their progress to receive feedback in a comfortable setting. My students attend conferences annually. Each of my graduate students has participated in a major observational field campaign, an opportunity which allows them to apply their classroom and research-based understanding to the real world.

Off-campus interaction. I have participated in several off-campus education outreach activities. I have given several educational talks at local schools in the Champaign-Urbana area. During Fall semester 2012, I gave a series of lectures at Polaris Academy on the west side of Chicago, a region that is socioeconomically-challenged, and then gave the students a tour of our department as well as other academic activities on campus. During an observational field campaign at the Universidade Federal do Santa Maria, Brazil in Fall 2012, I gave a day-long seminar on polarimetric radar to graduate students. While on sabbatical in Spring 2015, I led an 8-day seminar on polarimetric radar and radar data processing in *python* at the Universidad de Buenos Aires, Argentina. Twice I have given national webinars on clouds and precipitation to the National Earth Science Teachers Association (Aug 2013, Feb 2015).

Self-Improvement. I am not afraid to ask for candid opinions from my students in and out of class about my teaching effectiveness. I take these recommendations from students seriously and have implemented changes in my teaching style accordingly. For example, in my ATMS 305 class, I regularly poll the students using online tools to assess student comprehension of the material and send polls and questionnaires to students using the online interactive chat platform *Slack* to gauge student engagement and learning. This guides how I perform reviews of the material and conduct assessments during class. I revise my courses each semester to ensure that the latest theory, computational approaches, and learning tools are being used. I also use the book *Eloquent Science* to develop new ideas for improving students' oral and written communication skills.

4. SERVICE

A. Summary of Service

1. Public Engagement

Speaker at the Central Illinois Chapter of the AMS, Lincoln, IL, Sep 2006
Speaker at the Illinois State Water Survey, Champaign, IL, Oct 2006
Interviewed by *Daily Illini* on the hurricane season, Sep 2007
Represented Atmospheric Sciences at the National Weather Service Open House, Lincoln, IL, Oct 2007
Speaker at earth science classes, Lancaster High School, Lancaster, NY, Oct 2007
Speaker in campus-wide lecture series on the North American Monsoon, State University of New York at Oswego, Oswego, NY, Oct 2007
Interviewed by *Daily Illini* on snowy weather, Feb 2008
Speaker at Early Learning preschool on hurricanes, Champaign, IL, Dec 2008
Speaker at Early Learning preschool on tornadoes, Champaign, IL, May 2009
Interviewed by *Daily Illini* on climate change impacts, Oct 2009
Interviewed by Medill News Service on weather exhibit at Chicago Museum of Sci. and Technology, May 2010
Speaker at Bottenfield Elementary School on tornadoes, Champaign, IL, May 2010
Interviewed by *Christian Science Monitor* on research on rapidly intensifying hurricanes, Aug 2011
Interviewed by American Institute of Physics *Discoveries and Breakthroughs Inside Science* on rapidly intensifying hurricanes, Aug 2011
Speaker at Booker T. Washington Elementary School on tornadoes, Champaign, IL, Mar 2012
Interviewed on rapidly intensifying hurricanes, *ORF* Austria Radio/Television, May 2012
Speaker at Leal Elementary School on weather and tornadoes, Urbana, IL, May 2012
Led short course on Spaceborne Radar at the European Radar and Hydrology conference, Toulouse, France, Jun 2012.

Speaker at Polaris Charter Academy on Hurricanes, Chicago, IL, Sep 2012
Hosted the 7th grade class (~80 students) from Polaris Charter Academy in the Department of Atmospheric Sciences, Urbana, IL, Nov 2012
Invited webinar speaker on the Global Precipitation Mission, CoCoRAHS Webinar Series, Jun 2013
Invited webinar speaker on the Remote Sensing of Clouds and Precipitation, National Earth Science Teachers Association, Aug 2013
Invited webinar speaker on the Remote Sensing of Clouds and Precipitation, National Earth Science Teachers Association, Feb 2015
Led 8-day workshop on “Applications of dual polarization radar data” at Universidad de Buenos Aires, Mar-Apr 2015
Interviewed by the CANAL 10 television station (in Spanish) in Córdoba, Argentina, Apr 2015
Interviewed by the University of Buenos Aires Public Affairs Bureau on RELAMPAGO field campaign, May 2015
Speaker on Clouds and Precipitation at Bottenfield Elementary School, Champaign, IL, May 2016.
Speaker on Clouds and Precipitation at University Primary School, Champaign, IL, Oct 2016
Interviewed by Business Insider on “Scientists around the world are worried about a Trump team proposal to ax NASA’s 58-year mission to study the Earth”, Dec 2016
Interviewed by University of Illinois College of LAS news article on RELAMPAGO, Jun 2017
Interviewed for Champaign-Urbana News-Gazette The Big 10 with Jeff D'Alessio: “What game-changing innovations could be on the horizon in the next 20 years”, Oct 2017
Interviewed by Perfil Newspaper, Buenos Aires, Argentina about RELAMPAGO, Apr 2018
Speaker on Tornado Safety, Campus Middle School for Girls, Urbana, IL, Jun 2018

2. Service to Disciplinary and Professional Societies or Associations

Member, AMS Science and Technology Advisory Committee on Radar Meteorology, 2007 – 2012
President-elect, Central Illinois Chapter of the AMS, 2007
President, Central Illinois Chapter of the AMS, 2007 – 2009
Faculty advisor, University of Illinois Chapter of the AMS, 2007 – 2013
Chaired session on “Error Metrics” at the World Meteorological Organization Workshop on High Resolution Precipitation Products, Geneva, Switzerland, Dec 2007
Chaired session on “Use of Lightning Data in the Operational Warning and Decision Making Process” at the 3rd Conference on the Meteorological Application of Lightning Data, AMS Annual Meeting, New Orleans, LA, Jan 2008
Member of Validation Working Group, International Precipitation Working Group, Coordination Group for Meteorological Satellites, World Meteorological Organization, Oct 2008 – present
Served on National Academy of Sciences Committee on Progress and Priorities of US Weather Research and Research-to-Operations Activities”, Woods Hole, MA, Jul 2009
Chaired session on “Quantitative Precipitation Estimation” at the 34th AMS Conference on Radar Meteorology, Williamsburg, VA, Oct 2009
Chaired session on “Convection” at the 29th AMS Conference on Hurricanes and Tropical Meteorology, Tucson, AZ, May 2010
Selection committee, Max Eaton Prize at the 29th AMS Conference on Hurricanes and Tropical Meteorology, Tucson, AZ, May 2010
Co-Chair, AMS 35th Conference on Radar Meteorology, Sep 2011
Selection committee, Spiros Geotis Prize at 35th AMS Conference on Radar Meteorology, Pittsburgh, PA, Sep 2011
Session co-convener, “Orographic precipitation: Measurement, Mechanisms, and Impact on Landforms”, AGU Fall Meeting, Dec 2011.
Session co-convener, “Remote Sensing of Tropical Cyclones and Tropical Convective Systems: Observation and Data Assimilation”, AGU Fall Meeting, Dec 2012.
Chair, AMS Science and Technical Advisory Committee on Radar Meteorology, 2013 – 2016.
Chaired session on “Applications” at the 4th International Workshop on Space-based Snowfall Measurement (IWSSM), Mammoth Lakes, CA, May 2013
Chaired session on “Precipitation and Microphysics Estimation – Research” at the 36th AMS Conference on Radar Meteorology, Breckenridge, CO, Sep 2013
Chaired session on “Invited keynote speaker: Precipitation and Microphysics Estimation – research” at the 36th AMS Conference on Radar Meteorology, Breckenridge, CO, Sep 2013
Chaired session on “Nowcasting techniques”, 8th European Conference on Radar in Meteorology and Hydrology, Garmisch-Partenkirchen, Germany, Sep 2014.

Session rapporteur, "Ground Validation Science", at 7th NASA Global Precipitation Measurement Ground Validation Workshop, Seoul, Korea, May 2015.
Chaired session on "Microphysical Studies, General Topics in Radar Meteorology, and New and Emerging Radar Technology" at 37th Conference on Radar Meteorology, AMS, Norman, OK, Sep 2015.
Chaired session on "Microphysical Studies" at 37th Conference on Radar Meteorology, AMS, Norman, OK, Sep 2015.
Chaired session on "Intense Continental Convection" at 2015 Fall Meeting, AGU, San Francisco, CA, Dec 2015.
Chaired session on "Polarimetric Radar Applications" at 2016 Fall Meeting, AGU, San Francisco, CA, Dec 2016.
Chaired session on "Intense Continental Convection" at 2016 Fall Meeting, AGU, San Francisco, CA, Dec 2016.
Member, Earth Sciences Council, United Space Research Association, 2016 – present
Chaired session at Midwest Student Conference on Atmospheric Research, University of Illinois, Sep 2017.

Editorship of Journals
Editor, Journal of Applied Meteorology and Climatology, AMS, 2010 – 2014

Journals, publishers, or federal agencies serving as a reviewer for submitted papers, books, or proposals
Atmosphera
Atmospheric Chemistry and Physics
Atmospheric Research
Bulletin of the AMS
Cambridge Press
Geography Compass
Geophysical Research Letters
Deutsche Forschungsgemeinschaft (German National Science Foundation)
International Journal of Climatology
IEEE Transactions on Remote Sensing
Journal of Applied Meteorology and Climatology
Journal of Atmospheric Sciences
Journal of Climate
Journal of Geophysical Research – Atmospheres
Journal of Hydrometeorlogy
Journal of Atmospheric and Oceanic Technology
Journal of the Meteorological Society of Japan
Monthly Weather Review
Natural Environment Research Council (United Kingdom)
National Science Foundation
National Oceanic and Atmospheric Administration
National Aeronautics and Space Administration
Quarterly Journal of the Royal Meteorological Society
Weather and Forecasting

3. Service to the University

<u>College and Campus</u>:
Member of College of Liberal Arts and Sciences Policy and Development Committee, 2007–2009
Member of College of Liberal Arts and Sciences Honors Council, 2012 – 2015
Member of College of Liberal Arts and Sciences Dean's Faculty Information Team, 2012 – 2013
Member of Water Council, Illinois Institute for Sustainability, Energy, and Environment (iSEE), 2014 – present
Member of College of Liberal Arts and Sciences General Education Council, 2015 – 2016, 2016 – 2018

<u>Department:</u>
Organized Department Seminars, 2008 – 2009
Member of Department Graduate Affairs Committee, 2007 – 2009, 2013 – 2014
Chair, Department Web Committee, 2007 – present
Member of Department Curriculum Committee, 2007 – 2009, 2015 – present
Chair, Department Curriculum Committee, 2012 – 2015
Research Poster Judge, School of Earth, Society, and Environment Research Review, 2009, 2010, 2013, 2015, 2016, 2017, 2018

Ogura Research Award departmental review committee, 2010, 2011, 2014, 2016, 2018
Prepared questions for and graded questions from Ph.D. graduate qualification exam, 2007 – 2014
Served on department head review committee, Spring 2013 semester
Chaired search committee for Junior Faculty Search, 2013 – 2014 academic year
Chaired discussion on department undergraduate and graduate Curriculum, 2014 department faculty retreat
Member of Department of Atmospheric Sciences Executive committee, 2015 – 2016, 2017 – 2018
Committee to form a new online graduate program in Atmospheric Sciences, 2017 – present

5. RESEARCH

A. Statement of Research Goals and Accomplishments

The most fundamental and complex research problems in climate and weather center around our poor understanding of basic properties of clouds and precipitation and our inability to determine quantitatively the many effects cloud and precipitation processes have on weather and climate. Estimates from current climate models indicate that Earth's average surface temperature will warm from 1.5 to 4°C by 2100 due to increases in greenhouse gases. Most of the uncertainty in this estimate is attributed to uncertain treatments of clouds and precipitation in climate models, and reducing large uncertainties in projecting local- to regional-scale climate change impacts relies on improving our knowledge of cloud and precipitation processes and their representation in models. Since my last promotion, I have led and participated in large new international projects at the forefront of our field designed to make fundamental advances in understanding of clouds and precipitation processes, this important component of the climate system. In the future, I will continue to contribute important advances in this area as the complex challenges that involve flows of water and energy through the earth system demand our scientific efforts.

Published work since promotion to associate professor at Illinois. I have developed complimentary research programs under the overarching theme of clouds' and precipitation's impacts on climate and weather, addressing some of the most pressing issues in weather and climate research. My specific research thrusts have (1) improved our understanding of the characteristics and physics of clouds and precipitation as part of the earth system, (2) quantified the spatiotemporal variability of precipitating clouds and their dynamical impacts as a function of environmental forcing, and (3) provided understanding of how precipitation processes and cloud systems impact climate variability. I am currently leading *the largest land-based field campaign effort ever conducted outside of the United States in the atmospheric sciences in South America* (described below in my current and future work) to study what my research portrays as the "world's most intense thunderstorms", and in addition, since my last promotion, I have either led or participated in a series of major multi-agency field campaigns, such as MC3E, GCPEx, IPHEX and OLYMPEX, all related to two overarching NASA satellite missions, the Tropical Rainfall Measurement Mission (TRMM) and the Global Precipitation Measurement (GPM) mission.

One focus area of my research has been on improving knowledge on the representation of ice clouds, which produce the majority of earth's precipitation, yet are the most difficult to simulate and observe due to their complex microphysical nature. Thus, the properties of ice clouds remain a key uncertainty in many aspects of weather and climate models and remote sensing retrievals. My work has focused on making breakthroughs in improving the characterization of ice clouds and reducing uncertainties in satellite measurements of their properties using data collected in complex multi-platform field campaigns (including aircraft, ground-based radars, and satellite measurements). We, for the first time, developed and employed a unique technique that directly evaluated observations of ice clouds from a 3-frequency airborne radar using direct measurements from an aircraft equipped with sophisticated laser-based probes that have the capability to characterize ice particle size distributions. We demonstrated that aggregate, low density snowflakes produce distinct scattering signatures compared to higher density rimed particles using radar reflectivity measurements that can only be acquired with a three-frequency radar system. Our research findings, published in *Geophysical Research Letters*, demonstrated that the 3-frequency radar retrieval technique, using OLYMPEX aircraft data using radar technology planned for future satellite missions, has promise for detecting key information important for the global retrieval of snowfall properties from space.

In two papers in 2018, one in the *Journal of Applied Meteorology and Climatology* and another in *Atmospheric Chemistry and Physics*, my research group and I developed a novel observationally-based method for retrieving ice particle size distributions. It is novel because it accounts analytically for the characteristic distribution of ice mass with particle size, without statistical artifacts that have plagued prior techniques. These publication emerged from a 2014 paper which I co-authored in *Journal of Applied Meteorology and Climatology,* which demonstrated the technique for drop size distributions in rain. This new paradigm for particle size distribution parameterization has broad applicability for remote sensing retrievals and improving microphysical parameterizations for ice clouds in weather and climate models. A new open-source aircraft-radar matching code I developed has also found applications for estimating individual particle masses using radar reflectivity measurements and aircraft *in situ* data.

Data we have collected from GPM field campaigns (NASA M3CE and GCPEx, in each of which I had leadership roles) have enabled the collection most comprehensive precipitation observational database to date, and have enabled other important published works. These resulting in two research articles published in *Bulletin of the American Meteorological Society*, with the GCPEx *BAMS* article seeing significant scientific contributions from me and my group members with my NASA colleagues. The findings of these and the aforementioned GPM-related publications together have represented a breakthrough for understanding ice clouds from satellite remote sensors, and were a key contribution to NASA's missions to understand our planet's environment from space. Based on my achievements in this area, I received two NASA research awards: the *NASA Group Achievement Award* and the *NASA Robert H. Goddard Award for Excellent Achievement in Science*.

In collaboration with students and numerous colleagues, I have published key papers that have advanced our understanding of mesoscale processes (studies of phenomena with scales ranging between individual clouds and storm systems), critical for improving representation of these processes in models. In a series of 3 papers, we published work which together improved our understanding of the roles of convective processes within the inner core of tropical cyclones during rapid intensification. We discovered in 2011 a mode of widespread moderate symmetric convection surrounding the tropical cyclone eye, and a mode of asymmetric yet intense convection. In two papers published in 2016, we used the Weather Research and Forecasting model to understand two contrasting paradigms of how tropical cyclones rapidly intensify. We discovered that both types of storms, while very different in structure, can produce very similar rates of intensification. Using a large set of satellite passive microwave data, we also quantitatively evaluated the frequency and structure of these two modes of intensification and used state-of-the-art radiative transfer models to interpret the precipitation processes within them, providing analyses that can help forecasters interpret tropical cyclone intensification using satellite imagery.

I have led, with my students and colleagues at Illinois, research geared towards improving the understanding of atmospheric convection. These resulted in papers examining a theory for the regulation of tornado intensity by the parent mesoscyclone updraft width, testing hypotheses governing dynamic processes for small scale vortices (on horizontal scales of ~10 km) in lake effect snow bands over the Great Lakes, and employing a novel technique to observe cold pool structure using radar data and high density surface mesonet data collected during MC3E. We have also examined the fine-scale structure of precipitation in the Western Ghats mountain range on the west coast of India, and discovered that extreme horizontal gradients in rainfall, poorly represented by climate models, are tightly coupled to the topography, driven by globally unique meteorological conditions in this region.

Beyond my core discipline, I have and continue to contribute to collaborative work that has used novel applications of remote sensing information. My collaborative work has fostered interdisciplinary research across science and engineering departments. For example, in a 2014 paper (co-authored with Illinois Geology Prof. Alison Anders), we used spaceborne radar observations to document regional variability in the precipitation-elevation relationship important to erosion and surface processes. We related changes in precipitation-elevation gradients to changes in environmental conditions, including atmospheric static stability. In another example, our paper in 2017 documented the structure of a massive volcanic eruption (Volcán Calbuco, Chile in 2015) with a C-Band dual-polarization radar and lightning detection network. I, along with my international colleagues, demonstrated that the dual polarization information provided by radar can separate different types of volcanic material (ash, small and large lapilli). We showed that the production of pyrocumulus lightning is related to the volume of ash rather than larger material (lapilli). These new techniques can be applied operationally to monitor volcanic hazards. In a 2014 paper in *Biomass and Bioenergy*, we wrote a review article discussing factors governing the feedbacks between agricultural land use change and climate impacts, and ecosystem services of biofuel production.

Current and Future Work. My research group currently is deeply involved in several large observational field campaigns. At present, I am leading a large international and interdisciplinary field campaign to be held in late 2018 called RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations), funded by the NSF, NASA, NOAA, and other agencies in Argentina and Brazil. This transformative $20 million project developed from two large scientific overview and experimental design documents submitted to the NSF from a science team that I led. As part of this project, I lead a group of 20 principal investigators, and coordinated the plans for the experimental design, instrumentation deployments, and field operations and logistics. In addition, within my research group I am leading the deployment of a state of the art C-Band radar at the University of Illinois funded by NSF that will be a primary observational asset for our campaign. In the future, I hope to bring more assets into the fold to compliment the U of I's leadership in atmospheric observations, including the ongoing establishment and development of instrumentation for a new cloud and precipitation observatory on the South Farms of the U of I campus.

Underpinning this effort research-wise was a paper published by myself with my student and colleagues, which used the first radar data in existence in subtropical South America (a new dual-polarization radar in Córdoba, Argentina) to understand the types of storms that produce high-impact weather in this region. The paper showed that supercell thunderstorms, similar to violent storms on the U.S. Great Plains, also occur in Argentina and produce hail, strong winds, flooding, and tornadoes. We showed that these storms then grow upscale to become larger organized convective systems, but in about one quarter of the time it takes for similar storms in the U.S. Great Plains. I also serve as a Co-Investigator of the $7.4 million DOE project called CACTI (Clouds, Aerosols, and Complex Terrain Interactions), which will be a 9-month ground and airborne campaign to study cloud lifecycle and cloud-aerosol interactions and climate in the same region as RELAMPAGO. *Collectively, these projects are the largest land-based atmospheric field campaigns ever conducted outside of the USA.* Within RELAMPAGO-CACTI, I currently lead a team of nearly 20 U.S. and international principal investigators, as well as interface with instrument teams at universities and national labs such at the National Center for Atmospheric Research, and at NASA and DOE labs. Under my leadership, we will study the processes that generate some of the world's most severe weather, the hydrometeorological and societal impacts of this weather, and the role of this weather in Earth's climate system.

My own research within these projects seeks to advance our knowledge of the controls on rainfall extremes, and how these rainfall extremes can be better represented in earth system models, with the goal of improving their prediction. In addition, collaborative research in these projects will be integrated with numerical modeling research based in the U.S. and Argentina to improve operational data assimilation and hazardous weather predictability, with hydrologists (using models such as WRF-Hydro, currently the operational hydrologic prediction model in the U.S.), and with social impacts researchers at the National Center for Atmospheric Research and the Servicio Meteorológico Nacional (the National Meteorological Service in Argentina). I see this combination of large projects that I conceived and continue to lead as a demonstration of how major multi-agency international research efforts can both involve stakeholders and provide a pathway for research to operations, ultimately leading to a direct improvement of prediction and mitigation of societal impacts from severe weather and hydrometeorological hazards. In addition to the scientific projects themselves, I am involved in several projects to enhance diversity and inclusion within the campaigns. I am co-leading an effort to ensure a harassment-free and inclusive environment for principal investigator and graduate student interactions in the campaign. I helped enable an NSF-funded Advanced Study Institute to fund 13 U.S. graduate students across diverse backgrounds to participate in the project, and an NSF GEO Opportunities for Leadership in Diversity study by social scientists to improve inclusiveness in field campaigns.

In addition to the RELAMPAGO-CACTI field campaign, I am also currently involved in the planning and execution of other major multi-million dollar field campaigns. Presently I am preparing for the CAMP2EX field experiment to obtain data to prepare for future NASA aerosol-cloud mission concepts. We will focus our studies on the roles of shallow convective clouds, cold pools, and aerosol-cloud interactions near the Philippines. In addition, I am deeply involved in the NASA Southern Cross field experiment based in Christchurch, New Zealand, which has been proposed to the NASA Earth Venture Suborbital mission, to study cloud, precipitation, and aerosol interactions over the poorly observed Southern Ocean.

Throughout my research career, I have maintained close relationships with programs across the weather, climate, and radiation programs at NASA, and I am poised to participate and be involved in future high-priority NASA Decadal Survey missions, particularly since missions studying clouds and precipitation were recently classified as a Tier 1 priority within the Survey report. I serve an official capacity at NASA as a member of the Scientific Advisory Group of the Aerosol and Clouds, Convection, and Precipitation (A-CCP) Mission, which is a select steering group for this future mission in its planning stages. I have also been a strong leader in using and proponent of developing open source programming in remote sensing science, working to enhance existing initiatives and developing new activities on campus in this area. Each of these activities together will be key for driving our nation's scientific and discovery infrastructure over the coming decades. I also have interest in SmallSat and CubeSat technology. CubeSats, with new miniaturized passive and active sensors, will be the future of earth observation, alongside the traditional large satellite missions. I will continue to seek leadership roles to leverage these new technologies in space and on the ground, and to expand remote sensing-related research and educational opportunities at Illinois.