

# Mark Anthony Askelson

Professor

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## Education

- Ph.D. in Meteorology, University of Oklahoma, Norman, **2002**  
Dissertation Title: *Kinematic, Dynamic, and Thermodynamic Impacts of Hook-Echo Hydrometeors, Including Explorations into the Utilization of Polarimetric Radar Data*  
Advisor(s): Drs. Jerry M. Straka and Dušan S. Zrníc (Co-advisor)
- M.S. in Meteorology, University of Oklahoma (OU), Norman, **1996**  
Thesis Title: *A Study of the Kinematic and Microphysical Evolution of a Supercell from First Echo Using Polarization Diversity Radar*  
Advisor(s): Drs. Jerry M. Straka and Dušan S. Zrníc (Co-advisor)
- B.S.M.S. (Meteorological Studies) and B.S. in Mathematics (Statistical Concentration), University of North Dakota (UND), Grand Forks, **1993** (double major)

## Appointments

- Interim Executive Director, Research Institute for Autonomous Systems (RIAS), University of North Dakota, Grand Forks, North Dakota, **October 2017 – Present**
- Professor, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, North Dakota, **August 2014 – Present**
- Associate Professor, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, North Dakota, **August 2006 – August July 2014**
- Assistant Professor, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, North Dakota, **August 2001 – July 2006**
- Graduate Research/Teaching Assistant, School of Meteorology, University of Oklahoma, Norman, Oklahoma, **August 1993 – July 2001**
- Undergraduate Research Assistant/Teaching Assistant, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, North Dakota, **August 1992 – May 1993**

## Teaching Experience

- Instructor of
- AtSc 575, Current/Special Topics—Objective Analysis, UND, **Fall 2002**
  - AtSc 528, Atmospheric Data Analysis, UND, **Fall 2004, 2006, 2010, 2012, 2014, 2016, 2018**
  - AtSc 460, Mesoscale Dynamics, UND

Co-taught with four other faculty, **Fall 2005**  
Solo delivery, **Spring 2008, 2011-2018**  
AtSc 450, Introduction to Cloud Physics Meteorology, UND, **Fall 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015**  
AtSc 450L, Introduction to Cloud Physics Meteorology Lab, UND, **Fall 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015**  
AtSc 420, Synoptic Meteorology II, UND, **Spring 2003, 2004, 2005, 2006, 2007**  
AtSc 419, Synoptic Meteorology I, UND, **Fall 2002, 2003, 2004, 2005, 2006**  
AtSc 411, Synoptic Meteorology, UND, **Fall 2007, 2008, 2011-2017**  
AtSc 310, Introduction to Weather Forecasting, UND, **Spring 2002, 2003**  
AtSc 370, Computer Concepts in Meteorology, UND, **Spring 2002**  
AtSc 110, Meteorology I, UND, Co-taught with four other faculty, **Fall 2002, 2003, 2004, 2005, 2006**

Teaching Assistant for Meteorology 5233, Cloud and Precipitation Physics, OU, **Fall 1999**  
Teaching Assistant for Meteorology 3213, Physical Meteorology I (Atmospheric Statics and Thermodynamics), OU, **Fall 1997**

Lab Instructor for Meteorology 210, Synoptic Meteorology, UND, **Spring 1993**

Guest lecturer:

Meteorology 3223, Physical Meteorology II (Cloud Physics, Atmospheric Electricity, and Optics), OU, **Spring 2000, 2001**

Meteorology 5233, Cloud and Precipitation Physics, OU, **Fall 1998**

Advising:

10 Undergraduate students, 1 Graduate student, **2004**

15 Undergraduate students, 1 Graduate student, **2003**

15 Undergraduate students, **2002**

15 Undergraduate students, **2001**

## **Research Interests**

Radar Meteorology, Utilization of Unmanned Aircraft Systems, Mesoscale Weather Prediction, Surface Transportation Weather, Model Initialization, Objective Analysis, Storm Dynamics, Cloud Physics, Cloud Modeling

## **Research Experience**

Interim Executive Director, Research Institute for Autonomous Systems (RIAS) (10% research effort), **October 2017-Present**

Professor, University of North Dakota (20% research effort), **October 2017-Present**

Professor, University of North Dakota (30% research effort), **August 2014-September 2017**

Associate Professor, University of North Dakota (30% research effort), **August 2006-July 2014**

Assistant Professor, University of North Dakota (30% research effort), **2001-2006**

Graduate Research Assistant, University of Oklahoma, **1993-2001**

Research Experience for Undergraduates participant in the North Dakota Tracer Experiment, Bismarck, North Dakota, **Summer 1993**

NASA National Space Grant College and Fellowship Program, UND, Grand Forks, **Fall 1992-Spring 1993**

Science Officer for the Campus Weather Service, Regional Weather Information Center, UND, Grand Forks, **Fall 1992-Spring 1993**

## **Professional Experience**

Research Associate for Iteris, **Summer 2014**

Consultant for Meridian Environmental Technology, **2003, 2008**

Chairperson, Mesoscale Data Integration Workshop, UND, September 9-10, **2002**

Consultant (rain-gauge network evaluation) for Vieux and Associates, Norman, Oklahoma, **2000**

Cooperative Education position with the North Central River Forecast Center, Minneapolis, Minnesota, **Summer 1990, Summer-Fall 1991, Summer 1992**

## **Grants and Funding**

### Funded:

Northern Border Security, UND Seed Grant, *Principal Investigator*, \$70,000, awarded **June 2020**.

HMMWV Battlefield Common Operating Picture (COP) Through Augmented Reality (AR), Department of Defense, *Co-Principal Investigator*, \$1,499,958, awarded **March 2020**.

UAS Safety Case Development, Process Improvement, and Data Collection, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$545,000, awarded **February 2020**.

UAS Test Data Collection and Analysis Phase II, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$74,953, awarded **February 2020**.

The BVLOS PortAble Node (B-PANE), Research North Dakota Program, *Co-Principal Investigator*, \$300,000, awarded **January 2020**.

Integrating Expanded and Nonsegregated UAS Operations, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$229,220, awarded **September 2019**.

Demonstration of a Framework for Secure, Remote, Autonomous, Multi-Drone Operation within the Utility Sector, Research North Dakota Program, *Co-Principal Investigator*, \$267,974, awarded **January 2019**.

DAA System Certification Whitepaper, Sierra Nevada Corporation (flow through Mississippi State University ASSURE Research & Development Corporation), *Principal Investigator*, \$22,500, awarded **November 2018**.

Small UAS Detect and Avoid Requirements for Limited BVLOS Operations: Separation Requirements and Testing, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$350,000, awarded **September 2018**.

UAS Test Data Collection and Analysis Phase I, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$240,000, awarded **September 2018**.

Performance Analysis of UAS Detection Technologies Operating in Airport Environments, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$100,000, awarded **April 2017**.

Enabling UAS Operations through support of a Terrestrial UAS Infrastructure, Research North Dakota Program, *Co-Principal Investigator*, \$500,000, awarded **January 2017**.

Small UAS Detect and Avoid Requirements Necessary for Limited Beyond Visual Line of Sight (BVLOS) Operations, Federal Aviation Administration (ASSURE Center of Excellence), *Principal Investigator*, \$399,992, awarded **October 2015**.

Cooperative Airspace Techniques and Visualization (CATV) Testing for Enabling UAS Operations, Research North Dakota Program, *Co-Principal Investigator*, \$300,000, awarded **September 2015**.

Northern Plains UAS Test Site, Federal Aviation Administration, *Investigator* (part of large team that prepared the proposal), \$4 million (funds provided by the State of North Dakota), awarded **December 2014**.

UAS SAA System Design, Subcontract to Epsilon Lambda Electronics Corporation under NASA-AMES SBIR project “Spherical Coverage Dual Mode Sensor for UAS Separation Assurance”, *Principal Investigator*, \$9250, awarded **May 2013**.

In Situ Measurements of Snow Crystals and Their Associated Polarimetric Signatures, North Dakota EPSCoR/National Science Foundation, *Co-Principal Investigator*, \$7500, awarded **May 2012**.

The Limited Deployment-Cooperative Airspace Project (LD-CAP), State of North Dakota Center of Excellence Program, *Principal Investigator*, \$2.7 million, awarded **October 2011**.

Aurora Project 2009-05: The Pavement Precipitation Accumulation Estimation System—Further Development, Aurora, *Co-Principal Investigator*, \$82,999, awarded **March 2010**.

Using Automotive Collision Risk Radars to Sense Precipitation: An Infrastructure Improvement Programs (IIP) Equipment Grant Initiative Proposal, North Dakota EPSCoR Program, *Principal Investigator*, \$37,961, awarded **February 2010**.

Development and Deployment of *Clarus*-Enabled Services: Enhanced Precipitation Estimation, Federal Highway Administration (subcontract via Meridian Environmental Technology, Inc.), *Principal Investigator*, \$55,566, awarded **October 2008**.

Development and Deployment of *Clarus*-Enabled Services: Spring Load Restriction Forecasting, Federal Highway Administration (subcontract via Meridian Environmental Technology, Inc.), *Principal Investigator*, \$51,430, awarded **October 2008**.

Unmanned Aerial System Remote Sense and Avoid System and Airborne Payload Analysis and Investigation, United States Air Force UAV Battle Lab, *Co-Principal Investigator/Principal Investigator*, \$9.656 million, awarded **September 2007**.

Unmanned Aerial System Remote Sense and Avoid System Development, United States Air Force UAV Battle Lab, *Co-Principal Investigator* (PIs: Ben Trapnell and Doug Marshall), \$1.0 million, awarded **September 2006**.

Army High Performance Computing Research Center Advanced Summer Institute, University of Minnesota, *Co-Principal Investigator*, \$59,000, awarded **April 2004**.

Surface Transportation Weather Research Center, Federal Highway Administration, *Investigator* (PI: Leon Osborne), total award \$831,000 for 2004-2005, awarded **January 2004**.

Army High Performance Computing Research Center Advanced Summer Institute, University of Minnesota, *Principal Investigator*, \$21,000, awarded **April 2003**.

Faculty Instructional Development Committee Materials/Software/Minor Equipment Purchase Grant, \$1082, awarded **February 2002**.

Army High Performance Computing Research Center, University of Minnesota, *Co-Principal Investigator*, \$2.1 million, awarded **August 2001**.

## Field Program Experience

LD-CAP, *PI*, **2012-2013**

STWRC Winter Field Program, *co-PI*, **2005-2008**

CRYSTAL-FACE, *Flight Scientist* (UNDs Citation II research aircraft), **2002**

TAMDAR Project, *Flight Scientist* (UNDs Citation II research aircraft), **2002**

FAA Offshore Project, *Flight Scientist* (UNDs Citation II research aircraft), **2002**

Verification of the Origins of Rotation in Tornadoes EXperiment-Rear Flank Downdraft (VORTEX-RFD), *Team leader, Mobile CLASS*, **1999**

subVORTEX, *Nowcaster*, **1998**

subVORTEX, *Nowcaster and Field Coordinator Assistant*, **1997**

VORTEX, *Team Leader, Turtle 2*, **1995**

VORTEX, *Turtle Team Member*, **1994**

Hurricanes at Landfall (HaL), *Team Leader, Mobile Mesonet*, **1999**

HaL, *Tower Team Member*, **1998**

Measure, Interpret, and Ground-truth Hydrometeors in Thunderstorms (MIGHT), *Aircraft Coordination Assistant*, **1995**

MIGHT, *Aircraft Coordination Assistant*, **1994**

## Publications

### Book/Book Chapter:

Haupt, S. E., S. Hanna, M. Askelson, M. Shepherd, M. A. Fragomeni, N. Debbage, and B. Johnson, **2018**: 100 years of Progress in Applied Meteorology Part II: Applications that Address Growing Populations. *A Century of Progress in Atmospheric and Related Sciences: Celebrating the American Meteorological Society Centennial, Meteor. Monogr. 59*, Amer. Meteor. Soc., Chapter 23.

### Peer-Reviewed (refereed) Lead Author:

Askelson, M. A., P. Drechsel, J. Nordlie, C. J. Theisen, C. Carlson, T. Woods, R. Forsyth, and R. Heitman, **2013**: MQ-9 Unmanned Aircraft Responsiveness to Air Traffic Controller Commanded Maneuvers: Implications for Integration into the National Airspace System. *Air Traffic Control Quarterly*, **21** (1), 79-92.

- Askelson, M. A., and J. M. Straka, **2005**: Response functions for arbitrary weight functions and data distributions. Part I: Framework for interpreting the response function. *Mon. Wea. Rev.*, **133**, 2117-2131.
- Askelson, M. A., P. M. Pauley, and J. M. Straka, **2005**: Response functions for arbitrary weight functions and data distributions. Part II: Response function derivation and verification. *Mon. Wea. Rev.*, **133**, 2132-2147.
- Askelson, M. A., **2002**: Kinematic, dynamic, and thermodynamic impacts of hook-echo hydrometeors, including explorations into the utilization of polarimetric radar data. Ph.D. dissertation, University of Oklahoma, 245 pp.
- Askelson, M. A., J. P. Aubagnac, and J. M. Straka, **2000**: An adaptation of the Barnes filter applied to the objective analysis of radar data. *Mon. Wea. Rev.*, **128**, 3050-3082.
- Askelson, M. A., **1996**: A study of the kinematic and microphysical evolution of a supercell from first echo using polarization diversity radar. M.S. final report, Dept. of Meteorology, University of Oklahoma, 94 pp.

Peer-Reviewed (refereed) Co-Author:

- Davies-Jones, R., V. T. Wood, and M. A. Askelson, **2019**: Ray curvature on a flat Earth for computing virtual WSR-88D signatures of simulated supercell storms. *Mon. Wea. Rev.*, **147**, 1065-1075.
- Naylor, J., M. A. Askelson, and M. S. Gilmore, **2012**: Influence of low-level thermodynamic structure on the downdraft properties of simulated supercells. *Mon. Wea. Rev.*, **140**, 2575-2589.
- Schultz, C. J., and M. A. Askelson, **2012**: Vertical variations of boundary layer potential buoyancy in tornadic and nontornadic near-storm environments, *Wea. Forecasting*, **27**, 1489-1506.
- Spencer, P. L., M. A. Askelson, and C. A. Doswell III, **2007**: Choosing the smoothing parameters within a multiple-pass Barnes objective analysis scheme: A cautionary note. *J. Atmos. Oceanic. Technol.*, **24**, 713-726.

Conference Proceedings/Preprints:

- Marsh, R., C. Theisen, M. Askelson, J. Nordlie, and N. Kimber, **2014**: Airspace aircraft information display system for flight operations in North Dakota. *IEEE Aerospace Conference 2014*, Big Sky, MT, 11 pp.
- Wehner, P. J., J. Schwartz, D. Hashemi, C. T. Howell III, H. A. Verstynen, C. Buttrill, M. Askelson, and W. Semke, **2013**: Evaluating prototype sense and avoid alternatives in simulation and flight. *Assoc. Unmanned Vehicle Systems International (AUVSI) Unmanned Systems 2013*, Washington D. C., 19 pp.
- Hart, R. D., L. F. Osborne Jr., J. J. Mewes, M. A. Askelson, and J. L. Hershey, **2012**: An evaluation of a simulation of sub-pavement conditions as they affect the implementation and removal of seasonal load restrictions. *Proc. 2012 International Conference on Winter Maintenance and Surface Transportation Weather*, Coralville, Iowa, 478-490.
- Reza, H., F. Gu, and M. Askelson, **2011**: Model based engineering of ground based risk mitigation system. *Proc. 2011 International Conf. Software Eng. Res. and Practice*, Las Vegas, Nevada, NV, 673-681.

- Theisen, C. J., M. A. Askelson, and E. Townsend, **2010**: An Eastern North Dakota airspace characterization through a collaborative mission between the University of North Dakota and the North Dakota Army National Guard 188<sup>th</sup> Air Defense Artillery Battalion. *Proc. AUVSI North America 2010*, Denver, CO, 15 pp.
- Reza, H., R. Marsh, and M. Askelson, **2010**: A fault tolerant architecture using AADLs for Unmanned Aircraft Systems (UAS). *Proc. Worldcomp Software Engineering Research and Practice 2010*, Las Vegas, NV, 180-184.
- Askelson, M. A., **2008**: The pavement precipitation accumulation estimation system. *Proc. 4<sup>th</sup> National Conf. on Surface Transportation Weather and 7<sup>th</sup> Int. Symp. on Snow Removal and Ice Control Technol.*, (Transportation Research Circular E-C126), Indianapolis, IN, Transportation Research Board, 544-557.
- Askelson, M. A., and L. F. Osborne Jr., **2008**: Proposed test bed for surface transportation weather technologies. *Proc. 4<sup>th</sup> National Conf. on Surface Transportation Weather and 7<sup>th</sup> Int. Symp. on Snow Removal and Ice Control Technol.*, (Transportation Research Circular E-C126), Indianapolis, IN, Transportation Research Board, 27-34.
- Trapnell, B., M. Askelson, and C. Theisen, **2008**: Ganged phased-array radar system: A ground-based risk mitigation strategy for UAS flight operations in the national airspace. *Unmanned Aircraft Systems: The Global Perspective 2008/2009*, 140-142.
- Askelson, M., H. Lin, M. Solum, and C. Chambers, **2005**: The response filter. *Proceedings, 21<sup>st</sup> Conf. on Weather Analysis and Forecasting/17<sup>th</sup> Conf. on Numerical Weather Prediction*, Washington, D.C., Amer. Meteor. Soc., 13 pp.
- Tilley, J., C. Paulsen, and M. Askelson, **2005**: Intercomparison of forecasts from very-high resolution MM5 and WRF physics-based ensembles: The dryline/Pacific frontal merger during STORM-FEST IOP 17. Preprint, *6<sup>th</sup> WRF/15<sup>th</sup> MM5 User's Workshop*, Boulder, CO, 4 pp.
- Askelson, M., J. Straka, and E. Rasmussen, **2004**: Precipitation, the rear flank downdraft, and tornadoes. *Proceedings, 22<sup>nd</sup> Conf. on Severe Local Storms*, Hyannis, MA, Amer. Meteor. Soc., 11 pp.
- MacGorman, D. R., D. Rust, O. van der Velde, M. Askelson, P. Krehbiel, R. Thomas, B. Rison, T. Hamlin, and J. Harlin, **2003**: Lightning relative to precipitation and tornadoes in a supercell storm. Preprints, *12<sup>th</sup> Int. Conf. on Atmos. Elec.*, Versailles, 203–206.
- MacGorman, D., D. Rust, O. van der Velde, M. Askelson, P. Krehbiel, R. Thomas, B. Rison, T. Hamlin, and J. Harlin, **2002**: Lightning relative to precipitation and tornadoes in a supercell storm during MEaPRS. Preprints, *21<sup>st</sup> Conf. on Severe Local Storms*, San Antonio, TX, Amer. Meteor. Soc., 423-426.
- Askelson, M. A., J. M. Straka, and B. A. Gordon, **1998**: The kinematic and microphysical evolution of the 22 June 1995 storm. Preprints, *19<sup>th</sup> Conf. on Severe Local Storms*, Minneapolis, MN, Amer. Meteor. Soc., 56-59.
- Askelson, M. A., J. M. Straka, and D. S. Zrnić, **1997**: A Study of the kinematic and microphysical evolution of a supercell from first echo using polarization diversity radar. Preprints, *28<sup>th</sup> Conf. on Radar Meteorology*, Austin, TX, Amer. Meteor. Soc., 9-10.

Askelson, M. A., J. M. Straka, and D. S. Zrnić, **1997**: A Study of the kinematic and microphysical evolution of a supercell from first echo using polarization diversity radar. Preprints, *The 2nd Korea-US Joint Workshop on Storm- and Mesoscale Weather Analysis and Prediction*, Seoul, South Korea, Korea Science and Engineering Foundation, 92-96. [Available from M. Askelson, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, ND, 58201.]

Patents:

Askelson, M., B. Trapnell, C. Theisen, R. Marsh, T. Young, and H. Reza, **2013**: Airspace Risk Mitigation System. United States Patent US 8,368,584 B2.

Technical Reports:

- Theisen, C., J. DeForest, M. Askelson, M. Chrit, N. Stevens, L. Reilly, H. Rose, J. Minnix, and G. Kirov, **2020**: Enabling UAS Operations through Support of a UAS Network Infrastructure. North Dakota Dept. of Commerce ResearchND program, 54 pp.
- Brooks, D., M. A. Askelson, Y. Cheng, S. Kroeber, C. Theisen, and T. Trask, **2018**: UAS Detection at Airports: Performance Analysis Final Report. USDOT FAA ASSURE, 67 pp.
- Askelson, M. A., A. Palmer, C. Theisen, S. Kroeber, R. Marsh, W. Semke, M. Mullins, and K. Foerster, **2017**: Limited Deployment-Cooperative Airspace Project (LD-CAP) Final Report. North Dakota Dept. of Commerce Centers of Excellence Program, 37 pp.
- Theisen, C., M. A. Askelson, N. Kaabouch, R. Marsh, S. Roman, and J. Cieplek, **2017**: Cooperative Airspace Techniques and Visualization (CATV) Testing for Enabling UAS Operations. North Dakota Dept. of Commerce ResearchND program, 128 pp.
- Askelson, M., and H. Cathey, **2017**: Small UAS Detect and Avoid Requirements Necessary for Limited Beyond Visual Line of Sight (BVLOS) Operations. USDOT FAA ASSURE, 508 pp.
- Askelson, M. A., C. Theisen, J. Tilley, and E. Townsend, **2013**: The Pavement Precipitation Accumulation Estimation System—Further Development. Prepared for the Aurora Program, Project 2009-05, 150 pp.
- Askelson et al., **2011**: Unmanned Aerial System Remote Sense and Avoid System and Airborne Payload Analysis and Investigation—Phase II Final Report. Prepared for the Joint Unmanned Aircraft Systems Center of Excellence under Contract No. FA4861-07-R-C003, 313 pp.
- Askelson et al., **2011**: Unmanned Aerial System Remote Sense and Avoid System and Airborne Payload Analysis and Investigation—Phase II Design Specification Report. Prepared for the Joint Unmanned Aircraft Systems Center of Excellence under Contract No. FA4861-07-R-C003, 45 pp.
- Askelson et al., **2011**: Atmospheric Sciences Applications of the Ganged Phased Array Radar-Risk Mitigation System (GPAR-RMS). Prepared for the Joint Unmanned Aircraft Systems Center of Excellence under Contract No. FA4861-07-R-C003, 43 pp.



- Askelson et al., **2010**: Unmanned Aerial System Remote Sense and Avoid System and Airborne Payload Analysis and Investigation—Phase I Final Report. Prepared for the Joint Unmanned Aircraft Systems Center of Excellence under Contract No. FA4861-07-R-C003, 222 pp.
- Askelson, M. A., and J. M. Straka, **1995**: A Report on the Utilization of Doppler Weather Radar to Monitor Precipitation Rates and Lightning Activity, For Weathernews Inc. and Kyushu Power Company, Japan, CIMMS, University of Oklahoma, 43 pp.
- Straka, J. M., and M. A. Askelson, **1995**: Utilization of Doppler Weather Radar, For Kyuden Power Company, Japan, CIMMS, University of Oklahoma.
- Askelson, M. A., **1993**: Simulation of Mount Pinatubo Aerosols Using a One-Dimensional Parameterized Model, For NASA National Space Grant College and Fellowship Program, administered by the North Dakota Space Grant Program, Dept. of Space Studies, University of North Dakota, 4 pp.

#### Abstracts:

- Carr, F. H., J. Zhang, K. K. Droegemeier, M. Askelson, and X. Yu, **1998**: The sensitivity of storm-scale QPF to various initialization procedures. *Extended Abstracts, Sixth International Conf. on Precipitation: Predictability of Rainfall at the Various Scales*, Mauna Lani Bay, HA, National Science Foundation, 4-11. [Available from M. Askelson, Department of Atmospheric Sciences, University of North Dakota, Grand Forks, ND, 58201.]
- MacGorman, D., D. Rust, O. van der Velde, M. Askelson, P. Krehbiel, R. Thomas, and B. Rison, **2001**: Lightning relative to graupel occurrence in a tornadic supercell storm during MEaPRS. *EOS Transactions, AGU (Fall Meeting Supplement)*, **82** (47), Abstract AE21A-05.

## **Professional Presentations**

### National/International:

- Prioritizing Safety, Security, and Privacy, 4th Unmanned Systems for Utilities & Power, Virtual Conference, **July 2020**.
- Leveraging Research Initiatives to Expediently Enable Operations, 4th Unmanned Systems for Utilities & Power, Virtual Conference, **July 2020**.
- ASSURE COE DAA Research: Operational Framework, Separation Framework, and Testing, ASSURE Panel, UAS TAAC 2019, Las Cruces, NM, **December 2019**.
- ASSURE COE Research: UAS Test Data Collection and Analysis, Assure Panel, UAS TAAC 2019, Las Cruces, NM, **December 2019**.
- sUAS Detect and Avoid (DAA) Requirements Necessary for Limited Beyond Visual Line of Sight (BVLOS) Operations: Separation Requirements and Testing, Inaugural Federal Aviation Administration (FAA) International Unmanned Aircraft Systems (UAS) Integration Research Roundtable, Washington, DC, **September 2019**.
- University-Led UAS BVLOS Research Guided By Industry Needs: Realizing Beyond Visual Line of Sight Panel (Participant), UAS Summit & Expo, Grand Forks, ND, **August 2019**.

UAS Test Data Collection and Analysis: Is Your UAS Safety Case Ready for Flight – Leveraging Research and Operations to Get to YES Panel (Participant), 2019 FAA UAS Symposium, Baltimore, MD, **June 2019**.

Founding a UAS Technology Startup in the Red River Valley, Panel (Participant), Drone Focus 2019, Fargo, ND, **May 2019**.

Autonomous Systems-An Ecosystem Approach, Focused Lunch (Participant), Drone Focus 2019, Fargo, ND, **May 2019**.

Enabling Real-World BVLOS: Transforming UAS Potential Into Realized Commercial Operations (Panel Participant), AUVSI XPONENTIAL, Chicago, IL, **May 2019**.

ASSURE COE DAA Research: Operational Framework, Solutions, and Testing, BVLOS Panel (Moderator), UAS TAAC 2018, Albuquerque, NM, **December 2018**.

Weather Innovation (Panel), ATCA Annual Conference & Exposition, Washington, DC, **October 2018**.

Airspace Access and Remote Sensing Needs, RTD 2018, Rolla, MO, **September 2018**.

Weather & UAS—Barriers and Opportunities, UAS Tech Forum 2018, Broken Arrow, OK, **September 2018**.

Research Institute for Autonomous Systems, UAS Summit & Expo (2018), Grand Forks, ND, **August 2018**.

The Intent and Impact of ASSURE, UAS Summit & Expo (2018), Grand Forks, ND, **August 2018**.

Counter UAS, Drone Focus 2018, Fargo, ND, **May 2018**.

Beyond Visual Line of Sight Operations, Drone Focus 2018, Fargo, ND, **May 2018**.

sUAS DAA Requirements Necessary for Limited BVLOS Operations, 91.113 (Right of Way Rules) Mitigation by Technology Workshop, McLean, VA, **March 2018**.

Performance Analysis of UAS Detection Technologies Operating in Airport Environments, UAS TAAC 2017, Santa Fe, NM, **December 2017**.

The Intent and Impact of ASSURE, UAS Summit & Expo (2017), Grand Forks, ND, **August 2017**.

DAA Research Focus Area, ASSURE Industry Day, AUVSI XPONENTIAL, Dallas, TX, **May 2017**

DAA Research Focus Area, ASSURE Fair, AUVSI XPONENTIAL, Dallas, TX, **May 2017**

Regulatory Environment: Current Environment and Path Forward, NCAR/EOL Community Workshop on Unmanned Aerial Systems for Atmospheric Research, Boulder, CO, **February 2017**

A2: sUAS DAA BVLOS Flight Testing, Science And Research Panel (SARP) Meeting, Washington, DC, **February 2017**

DAA Research Focus Area, Industry Day, UAS TAAC 2016, Santa Fe, NM, **December 2016**

DAA Research Focus Area (Panel), UAS TAAC 2016, Santa Fe, NM, **December 2016**

DAA Research Focus Area (Panel), AIAA Demand for Unmanned Symposium (AIAA Aviation and Aeronautics Forum 2016), Washington, DC, **June 2016**

DAA Research Focus Area (Panel), AUVSI XPONENTIAL, New Orleans, LA, **May 2016**

A2: sUAS DAA BVLOS, Science And Research Panel (SARP) Meeting, Washington, DC, **March 2016**

A2: sUAS DAA BVLOS, Science And Research Panel (SARP) Meeting, Hampton, VA, **January 2016**

A2: sUAS DAA BVLOS, UAS TAAC 2015, Santa Ana Pueblo, NM, **December 2015**

Unmanned Aircraft: Turning Potential into Reality, *Invited Presentation*, 2013 MAGIC State GIS Clearinghouse Summit, Bismarck, ND, **August 2013**

Further Developments in the Pavement Precipitation Accumulation Estimation Algorithm (PPAES), 28<sup>th</sup> Conf. on Interactive Information Processing Systems, New Orleans, LA, **January 2012**

Limited Deployment-Cooperative Airspace Project: Exploring the Viability of Cooperative Autonomous Sense and Avoid for Unmanned Aircraft Systems, 2011 UAS Action Summit, Grand Forks, ND, **June 2011**

Societal Impacts of Adverse Winter Weather, *Invited Presentation*, MSC/COMET Winter Weather Course 11-1, Boulder, CO, **October 2010**

The Ganged Phased Array Radar-Risk Mitigation System (GPAR-RMS): Integrating Weather Effects, 14<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, 90<sup>th</sup> American Meteorological Society Annual Meeting, Atlanta, GA, **January 2010**

Societal Impacts of Adverse Winter Weather, *Invited Presentation*, MSC/COMET Winter Weather Course 10-1, Boulder, CO, **October 2009**

Air Force Sponsored UAS Research at UND—Display Concepts, 3-5 February 2009 Collaborative Focus Days, Arlington, VA, **February 2009**

Societal Impacts of Adverse Winter Weather, *Invited Presentation*, MSC/COMET Winter Weather Course 09-1, Boulder, CO, **October 2008**

The Precipitation Accumulation Estimation System (PPAES), 7<sup>th</sup> International Symposium on Snow Removal and Ice Control Technology, Indianapolis, IN, **June 2008**

The Ganged Phased Array Radar Risk Mitigation System: Atmospheric Science Applications, American Geophysical Union 2008 Joint Assembly, Fort Lauderdale, FL, **May 2008**

On the use of Satellite Cloud Top Pressure Data in the Estimation of Snowfall Occurrence and Precipitation Rates, 23<sup>rd</sup> International Conference on Interactive Information Processing Systems for Meteorology, Oceanography and Hydrology, 87<sup>th</sup> American Meteorological Society Annual Meeting, San Diego, CA, **January 2007**

Atmospheric Effects in Signature Modeling, Army High Performance Computing Research Center Annual Review, Minneapolis, MN, **October 2006**

STWRC Research Update, PFS MDSS Meeting, Sioux Falls, SD, **October 2006**

The Pavement Precipitation Accumulation Estimation System (PPAES), National Rural ITS Conference 2006, ITS America, Big Sky, MT, **August 2006**

Atmospheric Effects in Signature Modeling, Army High Performance Computing Research Center Quarterly Review, Aberdeen, MD, **May 2006**

An Initial Evaluation of the Performance of the Pavement Precipitation Accumulation Estimation System (PPAES), 22<sup>nd</sup> International Conference on Interactive Information Processing Systems for Meteorology, Oceanography and Hydrology, 86<sup>th</sup> American Meteorological Society Annual Meeting, Atlanta, GA, **January 2006**

Atmospheric Effects in Signature Modeling—Response Filter Testing, Army High Performance Computing Research Center Annual Review, Minneapolis, MN, **August 2005**

The Response Filter, Poster 1.23, 21<sup>st</sup> Conference on Weather Analysis and Forecasting/17<sup>th</sup> Conference on Numerical Weather Prediction, Washington, D.C., **August 2005**.

Atmospheric Effects in Signature Modeling, Army High Performance Computing Research Center Quarterly Review, Aberdeen, MD, **May 2005**

The Pavement Precipitation Accumulation Estimation System (PPAES), Poster 1.24, 21<sup>st</sup> International Conference on Interactive Information Processing Systems for Meteorology, Oceanography and Hydrology, 85<sup>th</sup> American Meteorological Society Annual Meeting, San Diego, CA, **January 2005**

Atmospheric Effects in Signature Modeling, Army High Performance Computing Research Center Annual Review, Minneapolis, MN, **August 2004**

Atmospheric Effects in Signature Modeling, Army High Performance Computing Research Center Quarterly Review, Aberdeen, MD, **May 2004**

Atmospheric Effects in Signature Modeling—UND, Army High Performance Computing Research Center Annual Review, Minneapolis, MN, **August 2003**

Atmospheric Effects in Signature Modeling: Data Analysis and the Response Filter, Army High Performance Computing Research Center Quarterly Review, Washington, D.C., **May 2003**

Chemical-Biological Applications of Mesoscale Atmospheric Modeling: Analysis Impacts, Army High Performance Computing Research Center Quarterly Review, Washington, D.C., **May 2003**

A Response-Function Based Adaptive Filter for the Analysis of Discrete, Irregularly-Distributed Data, Mesoscale Data Integration Workshop, University of North Dakota, Grand Forks, ND, **September 2002**

Signature Modeling Applications of an Innovative Objective Analysis Technique, Army High Performance Computing Research Center Quarterly Review, Clark Atlanta University, GA, **May 2002**

Regional:

RIAS, Defense Alliance, Virtual, **June 2020**.

DAA Research Focus Area (Panel), ASSURE EXPO, Washington, D.C., **February 2016**

Detect and Avoid, Poster, ASSURE EXPO, Washington, D.C., **February 2016**

LD-CAP ADS-B Equipage, Webinar, Grand Forks, ND, **June 2015**

Unmanned Aircraft: Turning Potential into Reality, *Invited Keynote Presentation*, 2013 NDGIS Users Conference, Grand Forks, ND, **September 2013**

Thermodynamic Structures and Tornadogenesis, *Invited Keynote Presentation*, 2012 Northern Plains Convective Storms Symposium, Grand Forks, ND, **May 2012**

Winter Weather Challenges and Opportunities, 12<sup>th</sup> Annual Northern Plains Weather Workshop, Bismarck, ND, **April 2008**

Precipitation, the Rear Flank Downdraft, and Tornadoes, 6<sup>th</sup> Annual Northern Plains Workshop, Bismarck, ND, **May 2002**

Local:

The North Dakota UAS Ecosystem (with Chris Theisen), NCAR, Boulder, CO, **August 2017**

UAS at UND: Center of Excellence: FAA Test Site, and Atmospheric Research (with Doug Olsen), NCAR, Boulder, CO, **August 2016**

Unmanned Aircraft: Turning Potential into Reality, MIT-LL C2E2 Unmanned Aircraft Systems Meeting, Lexington, MA, **February 2016**

Unmanned Aircraft: Turning Potential into Reality, *Invited Presentation*, NCAR Research and Development Strategy Sessions UAV Roundtable, National Center for Atmospheric Research, Boulder, CO, **June 2014**

Unmanned Aircraft: Turning Potential into Reality, *Invited Keynote Presentation*, Deans Lecture Series University of North Dakota 2013 Scholarly Forum, Univ. of North Dakota, **March 2013**

Atmospheric EM Paths, Mesoscale Group, Univ. of North Dakota, **February 2012**.

National Airspace Integration Efforts at UND (Part of National Airspace Integration Panel), U.S. Air Force Academic Outreach Symposium, Grand Forks, ND, **August 2009**

The Response Filter: An Approach for Adapting to Irregular Data Distributions, *Invited Presentation*, Scripps Institute of Oceanography, La Jolla, CA, **April 2009**

Winter Precipitation Challenges, *Invited Presentation*, Hydrologic Research Center, San Diego, CA, **April 2009**

The Pavement Precipitation Accumulation Estimation System (PPAES), University of North Dakota, Grand Forks, ND, **November 2007**

Road Weather, *Invited Presentation*, Maintenance Engineer Training Program, Devil's Lake, ND, **12 October 2006** (w/Leon Osborne)

Road Weather, *Invited Presentation*, Maintenance Engineer Training Program, Devil's Lake, ND, **5 October 2006** (w/Leon Osborne)

Precipitation, the Rear-Flank Downdraft, and Tornadoes, *Invited Presentation*, Department of Meteorology Seminar Series, The Pennsylvania State University, State College, PA, **April 2005**.

Precipitation, the Rear-Flank Downdraft, and Tornadoes, *Invited Presentation*, Department of Atmospheric Sciences Seminar Series, University of Illinois at Urbana-Champaign, Urbana, IL, **October 2004**

Precipitation, the Rear-Flank Downdraft, and Tornadoes, University of North Dakota Scholarly Forum, Grand Forks, ND, **March 2004**

The Response Filter: An Approach for Adapting to Irregular Data Distributions, University of North Dakota, Grand Forks, ND, **November 2003**

The Response Filter: An Approach for Adapting to Irregular Data Distributions, White Sands Missile Range, NM, **October 2003**

Precipitation, the Rear Flank Downdraft, and Tornadoes, National Weather Service Forecast Office, Grand Forks, ND, **June 2002**

Precipitation, the Rear Flank Downdraft, and Tornadoes, University of North Dakota, Grand Forks, ND, **October 2002**

## Honors and Awards

The UND Interdisciplinary Collaboration in Research or Creative Work Award, Research Institute for Autonomous Systems (Mark Askelson, Jeremiah Neubert, Prakash Ranganathan, and Jason Jensen), UND Founders Day, **28 February 2019**

Best Junior/Senior Professor, Department of Atmospheric Sciences, (UND student chapter of the American Meteorological Society), UND, **2014-2015**

7-Eleven/Most Available Professor, Department of Atmospheric Sciences, (UND student chapter of the American Meteorological Society), UND, **2013-2014**

Best Junior/Senior Professor, Department of Atmospheric Sciences, (UND student chapter of the American Meteorological Society), UND, **2012-2013**

Interdisciplinary Collaborative Research or Creative Work Award, UND, **2011**

North Dakota Spirit Faculty Achievement Award, UND, **2009**

Outstanding Professor—Junior/Senior Level, Department of Atmospheric Sciences, (UND student chapter of the American Meteorological Society), UND, **2007-2008**

Above and Beyond..., for work on DoD Radar Project Contract, John D. Odegard School of Aerospace Sciences award, UND, **September 2007**

Outstanding Professor—Graduate Level, Department of Atmospheric Sciences, (UND student chapter of the American Meteorological Society), UND, **2006-2007**

Outstanding Professor—Junior and Senior Classes, Department of Atmospheric Sciences (UND student chapter of the American Meteorological Society), UND, **2005-2006**

Outstanding Research Helper, Department of Atmospheric Sciences (UND student chapter of the American Meteorological Society), UND, **2005-2006**

Outstanding Service to the Department, Department of Atmospheric Sciences (UND student chapter of the American Meteorological Society), UND, **2004-2005**

Most Dedicated Professor, Department of Atmospheric Sciences (UND student chapter of the American Meteorological Society), UND, **2003-2004**

Outstanding Departmental Research Award, UND award to the Department of Atmospheric Sciences, UND, **2003**

Professor of the Year, Department of Atmospheric Sciences (UND student chapter of the American Meteorological Society), UND, **2001-2002**

Douglas Lilly Award for Best Ph.D. Manuscript/Publication, School of Meteorology, OU, Norman, **2000**

American Meteorological Society (AMS)/Industry Graduate Fellowship, American Meteorological Society and Cray Research, Inc., **1993-1994**

Phi Beta Kappa, UND, **1993**

Outstanding Graduating Senior, Department of Atmospheric Sciences, UND, Grand Forks, **1993**

Outstanding Overall Student, Department of Atmospheric Sciences, UND, Grand Forks, **1993**

Outstanding Student Researcher, Department of Atmospheric Sciences, UND, Grand Forks, **1993**

National Space Grant College and Fellowship Program Fellowship, North Dakota Space Grant Program, Department of Space Studies, UND, Grand Forks, **1992**

Outstanding Senior Student, Department of Atmospheric Sciences, UND, Grand Forks, **1992**

Outstanding Junior, Department of Atmospheric Sciences, UND, Grand Forks, **1990**

Outstanding Sophomore, Department of Atmospheric Sciences, UND, Grand Forks, **1989**

D. J. Robertson Award (recognizing outstanding freshmen), UND, Grand Forks, **1988**

Numerous Undergraduate Merit Scholarships

## Service

### Presentations/Outreach:

- Science Resource, Cub Scout Electives for Pack 19, Thompson, ND, **2016-present**  
Demonstration (“Tornadoes!”), for Thompson ND First Grade Class (Mrs. Schwabe),  
Thompson, ND, **April 2016**
- Speaker (“Societal Impacts of Adverse Winter Weather”) for JOY (Just Older Youth), St.  
Mark’s Lutheran Church, Grand Forks, ND, **19 August 2015**
- Demonstration (“Tornadoes!”), for Thompson ND Kindergarten Class (Mrs. Inglis),  
Thompson, ND, **2 April 2015**
- Keynote Speaker (“Science?”) for North Dakota State Science & Engineering Fair  
Banquet (for 9<sup>th</sup>-12<sup>th</sup> grade students), **26 March 2015**
- Panel Member, ND EPSCoR Proposal Writing Workshop, **15 April 2014.**
- Keynote Speaker (“Science?”) for North Dakota State Science & Engineering Fair  
Banquet (for 9<sup>th</sup>-12<sup>th</sup> grade students), **29 March 2012**

### Committees/Organizations:

- RTCA SC 203, **Spring 2013.**
- Intellectual Property Committee, University Senate Committee, UND, **Fall 2012-Present**
- Policies and Procedures Committee, UND, **Fall 2012-2018**
- American Meteorological Society (AMS) Intelligent Transportation Systems & Surface  
Transportation Committee (ITS/STC), **2009-2013**
- Graduate Committee, Department of Atmospheric Sciences, UND, Grand Forks, **2001-  
Present**
- Promotion and Tenure Committee, Department of Atmospheric Sciences, UND, Grand  
Forks, **Fall 2008-Present**
- Forecast Working Group, Department of Atmospheric Sciences, UND, Grand Forks, **Fall  
2008-Present**
- Information Technology Committee, Department of Atmospheric Sciences, UND, Grand  
Forks, **Fall 2008-Present**
- Local Manager for National Forecasting Contest (WxChallenge), **2005-2009; 2013-  
Present**
- Chemistry Undergraduate Program Review Committee, UND, Grand Forks, **Fall 2012-  
Spring 2013**
- Chair, Special Review Committee, Vice President for Research and Economic  
Development, **2011**
- John D. Odegard School of Aerospace Sciences Promotion and Tenure Committee, UND,  
Grand Forks, **Fall 2010**
- Interim Graduate Programs Director, Department of Atmospheric Sciences, UND, Grand  
Forks, **Fall 2008-Spring 2009**
- Co-Chair, Search Committee for Director of UND Center for UAS Research, Education,  
and Training, UND, Grand Forks, ND, **Spring 2009**
- Organizing Committee, 2009 Unmanned Aircraft Systems Action Summit, UND, Grand  
Forks, ND, **Fall 2008-Spring 2009**
- Panel Member, UND Alice T. Clark meeting regarding promotion and tenure, **Fall 2007**
- Mathematics Graduate Program Review Committee, UND, Grand Forks, **Fall 2006-  
Spring 2007**

Presentation to UND Student Chapter of the American Meteorological Society, **February 2005**

Panel Member, UND Office of Instructional Development Box Lunch Discussion Session: What Makes a Good Graduate Advisor?, **Fall 2004**

Presenter, UND Department of Atmospheric Sciences Career Fair, **Fall 2004**

Chair of Conflict of Interest/Scientific Misconduct Committee, University Senate Committee, UND, Grand Forks, **Fall 2004-Spring 2006**

University Research Council, UND, Grand Forks, **Fall 2004-Spring 2006**

Lead, Doctor of Philosophy in Atmospheric Sciences Program proposal development, **Fall 2003-Spring 2006**

Graduate Program Reviewer for UND Graduate Committee, **2003**

Library Committee, University Senate Committee, UND, Grand Forks, **2003-2005**

Conflict of Interest/Scientific Misconduct Committee, University Senate Committee, UND, Grand Forks, **2003**

Library Committee, Department of Atmospheric Sciences, UND, Grand Forks, **2001-2008**

Advisor, Student Chapter of the American Meteorological Society, UND, **Fall 2001-Spring 2003**

Secretary, National Severe Storms Laboratory (NSSL) and Storm Prediction Center Employees Association (NSEA), Norman, Oklahoma, **2000-2001**

Tour Guide/Liaison to numerous civic organizations, NSSL, Norman, Oklahoma, **1995-2001**

Chairperson, Student Affairs Committee, School of Meteorology, OU, Norman, **1995**

Graduate Students Representative, OU Student Chapter of the American Meteorological Society, (OUSCAMS), School of Meteorology, OU, Norman, **1993-1994, 1995-1996**

Wing Representative, West Hall, UND, Grand Forks, **1988-1989**