

Mark S. Kulie

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Space Science and Engineering Center
University of Wisconsin-Madison
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Education

- | | |
|---|------|
| Doctor of Philosophy | 2010 |
| <i>University of Wisconsin-Madison, Atmospheric and Oceanic Sciences
Dissertation Topic: Microwave remote sensing of precipitation at higher latitudes
Advisor: Dr. Ralf Bennartz</i> | |
| Master of Science | 1996 |
| <i>North Carolina State University, Atmospheric Science
Thesis Topic: Numerical simulations of severe convective storms
Advisor: Dr. Yuh-Lang Lin</i> | |
| Bachelor of Science, Engineering | 1993 |
| <i>University of Michigan, Meteorology</i> | |

Employment

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|---|--------------|
| Associate Researcher | 2014-present |
| <i>Cooperative Institute for Meteorological Satellite Studies
Space Science and Engineering Center
University of Wisconsin-Madison, Madison, WI</i> | |
| Assistant Lecturer | 2013-2014 |
| <i>Department of Atmospheric and Oceanic Sciences
University of Wisconsin-Madison, Madison, WI
Courses Taught: AOS 630, AOS 340</i> | |
| Assistant Researcher | 2011-2014 |
| <i>Cooperative Institute for Meteorological Satellite Studies
Space Science and Engineering Center
University of Wisconsin-Madison, Madison, WI</i> | |
| Research Associate | 2010-2011 |
| <i>Cooperative Institute for Meteorological Satellite Studies
Space Science and Engineering Center
University of Wisconsin-Madison, Madison, WI</i> | |

Part-Time Adjunct Faculty <i>Madison College</i> <i>Madison, WI</i>	2010-present
Editorial Assistant <i>Journal of Applied Meteorology and Climatology</i> <i>American Meteorological Society</i>	2004-2010
Graduate Research Assistant <i>Department of Atmospheric and Oceanic Sciences</i> <i>University of Wisconsin-Madison, Madison, WI</i>	2004-2010
Graduate Teaching Assistant <i>Department of Atmospheric and Oceanic Sciences</i> <i>University of Wisconsin-Madison, Madison, WI</i>	2005-2007
Research Intern <i>Department of Atmospheric and Oceanic Sciences</i> <i>University of Wisconsin-Madison, Madison, WI</i>	2003
Research Analyst/Assistant Research Scientist <i>NASA Goddard Space Flight Center (GSFC), Greenbelt, MD</i>	1997-2001
Programmer/Analyst <i>Science and Technology Corporation</i> <i>National Environmental Satellite Data and Information Service, Suitland, MD</i>	1996-1997
Graduate Research Assistant <i>Department of Marine, Earth, and Atmospheric Sciences</i> <i>North Carolina State University, Raleigh, NC</i>	1994-1996
Graduate Teaching Assistant <i>Department of Marine, Earth, and Atmospheric Sciences</i> <i>North Carolina State University, Raleigh, NC</i>	1994-1995

Honors and Awards

NASA New Investigator Program funding recipient	2012
Exceptional Service Award for Teaching <i>University of Wisconsin-Madison (Campus-wide award)</i>	2008
Wahl Award (Outstanding performance as a Teaching Assistant) <i>University of Wisconsin-Madison AOS</i>	2008
Colloquium Student Service Award <i>University of Wisconsin-Madison AOS</i>	2008
Wahl Award (Outstanding performance as a Teaching Assistant) <i>University of Wisconsin-Madison AOS</i>	2007

Colloquium Student Service Award <i>University of Wisconsin-Madison AOS</i>	2007
Outstanding student poster presentation <i>American Geophysical Union Joint Assembly Hydrology Section</i>	2006
Graduate Fellowship <i>Wisconsin Space Grant Consortium</i>	2005
Schwerdtfeger Award (Excellent performance in first year of graduate studies) <i>University of Wisconsin-Madison AOS</i>	2005
Outstanding Technical Support Award <i>NASA GSFC Laboratory for the Atmosphere</i>	2000
Outstanding Achievement Award <i>NASA GSFC Mesoscale Atmospheric Processes Branch</i>	1999
Phi Kappa Phi National Honor Society <i>North Carolina State University</i>	1996
Outstanding Departmental Teaching Assistant <i>North Carolina State University MEAS</i>	1995
Graduated <i>Magna Cum Laude</i> <i>University of Michigan</i>	1993
Member of National Champion Solar Car Team <i>University of Michigan</i>	1993
Dean's List <i>University of Michigan College of Engineering</i>	1992
Honorary Engineering Transfer Award <i>University of Michigan College of Engineering</i>	1991
Class Honors <i>University of Michigan College of the Literature, Sciences, and Arts</i>	1991
Class Honors <i>University of Michigan College of the Literature, Sciences, and Arts</i>	1990

Courses Taught

University of Wisconsin-Madison

- AOS 441: Radar and Satellite Meteorology – Computer Laboratory (3 semesters)
- AOS 101: Weather and Climate Discussion Section (1 semester)
- AOS 100: Weather and Climate (Guest lecturer)
- AOS 331: Dynamics of the Atmosphere and Ocean II (Guest lecturer)
- AOS 340: Physics of the Atmosphere and Ocean I (Lecturer, Guest lecturer)
- AOS 441: Radar and Satellite Meteorology (Guest lecturer)
- AOS 630: Introduction to Atmospheric and Oceanic Physics (Lecturer, Guest lecturer)

North Carolina State University

MEA 135: Introduction to Weather and Climate Lab (2 semesters)

Madison College

Weather and Climate (3 semesters)

Courses Developed

University of Wisconsin-Madison

AOS 441: Radar and Satellite Meteorology (Laboratory component)

Teaching Professional Development

American Meteorological Society Symposium on Education	2007, 2008, 2011
University of Wisconsin-Madison Delta Program Activities/Courses	2006-2010
University of Wisconsin-Madison Teaching and Learning Symposium	2008
Preparing for an Academic Career in the Geosciences Workshop	2007

Computing Skills

IDL/FORTRAN programming, Unix/Mac/PC computing environments, meteorological software packages (IDV, Grads, McIDAS-V, Gempak)

Refereed Publications

Kulie, M. S., M. J. Hiley, R. Bennartz, S. Kneifel ,and S. Tanelli, 2014: Triple frequency radar reflectivity signatures of snow: Observations and comparisons to theoretical ice particle scattering models. *J. Appl. Meteor. Clim.*, **53**, 1080-1098.

Bennartz, R., M. D. Shupe, D. D. Turner, V. P. Walden, K. Steffen, C. J. Cox, **M. S. Kulie**, N. B. Miller, and C. Pettersen, 2013: July 2012 Greenland melt extent enhanced by low-level liquid clouds. *Nature*, **496**, 83-86, doi:10.1038/nature12002.

Shupe, M. D., D. D. Turner, V. P. Walden, R. Bennartz, M. P. Cadetdu, B. B. Castellani, C. J. Cox, D. R. Hudak, **M. S. Kulie**, N. B. Miller, R. R. Neely III, and W. D. Neff, 2013: High and Dry: New Observations of Tropospheric and Cloud Properties above the Greenland Ice Sheet. *Bull. Amer. Meteor. Soc.*, **94**, 169-186.

Miller, N. B., D. D. Turner, R. Bennartz, M. D. Shupe, **M. S. Kulie**, and M. Cadetdu, 2013: Surface-based inversions above central Greenland, *J. Geophys. Res.*, **118**, 495-506, doi:10.1029/2012JD018867,.

M. J. Weber, B. B. Yang, **M. S. Kulie**, R. Bennartz, and J. H. Booske, 2012: Atmospheric Attenuation of 400 GHz Radiation due to Water Vapor. *IEEE Transactions on Terahertz Sci. and Tech.*, **2**, 355-360.

Di Michele, S., M. Ahlgrimm, R. Forbes, **M. Kulie**, R. Bennartz, M. Janiskova, and P. Bauer, 2012: Interpreting an evaluation of the ECMWF global model with CloudSat observations:

Ambiguities due to radar reflectivity forward operator uncertainties, *Quart. J. Roy. Meteor. Soc.*, **138**, 2047-2065.

Kneifel, S., **M. S. Kulie**, and R. Bennartz, 2011: A triple-frequency approach to retrieve microphysical snowfall parameters. *J. Geophys. Res.*, **116**, D11203, doi:10.1029/2010JD015430.

Hiley, M. J., **M. S. Kulie**, and R. Bennartz, 2011: Uncertainties in CloudSat snowfall retrievals. *J. Appl. Meteor. Clim.* **50**, 399-418.

Kulie, M. S., R. Bennartz, T. Greenwald, Y. Chen, and F. Weng, 2010: Uncertainties in microwave optical properties of frozen precipitation: Implications for remote sensing and data assimilation. *J. Atmos. Sci.* **67**, 3471-3487.

Kulie, M. S. and R. Bennartz, 2009: Utilizing spaceborne radars to retrieve dry snowfall. *J. Appl. Meteor. Clim.*, **48**, 2564-2580.

Kim, M.-J., **M. S. Kulie**, C. O'Dell, and R. Bennartz, 2007: Scattering of ice particles at microwave frequencies: A physically based parameterization, *J. Appl. Meteor. Clim.*, **46**, 615-633.

Robinson, M., **M. S. Kulie**, D. Silberstein, D. A. Marks, D. B. Wolff, E. Amitai, B. S. Ferrier, B. Fisher, and J. Wang, 2000: Evolving Improvements to TRMM Ground Validation Rainfall Estimates. *Physics and Chemistry of the Earth (PCE), Part B: Hydrology, Oceans, and Atmosphere*, **25**, 971-976.

Marks, D. A., **M. S. Kulie**, M. Robinson, D. Silberstein, D. B. Wolff, B. S. Ferrier, E. Amitai, B. Fisher, J. Wang, D. Augustine, and O. Thiele, 2000: Climatological Processing and Product Development for the TRMM Ground Validation Program. *Physics and Chemistry of the Earth (PCE), Part B: Hydrology, Oceans, and Atmosphere*, **25**, 871-876.

Amitai, E., D. B. Wolff, M. Robinson, D. A. Marks, **M. S. Kulie**, and B. S. Ferrier, 2000: Systematic Variations of Z-R Relations: Implications to Hydrology. *Remote Sensing & Hydrology 2000*, IAHS Press, Santa Fe, NM, USA.

Kulie, M. S. and Y.-L. Lin, 1998: The Structure and Evolution of a Numerically Simulated High-Precipitation Supercell Thunderstorm. *Mon. Wea. Rev.*, **126**, 2090-2116.

Lin, Y.-L., R. L. Deal, and **M. S. Kulie**, 1998: Mechanisms of Cell Regeneration, Splitting, and Merging within a Two-Dimensional Multicell Thunderstorm. *J. Atmos. Sci.*, **55**, 1867-1886.

Other Publications

Wagner, T. J., and **M. S. Kulie**, 2011: Watching for warnings: a real-time severe weather nowcasting simulation for the undergraduate classroom. *American Meteorological Society (AMS) 20th Symposium on Education*, Seattle, WA, 24-28 January 2001. Proceedings.

Kulie, M. S., 2010: Active and passive microwave remote sensing of precipitation at higher latitudes. Ph.D. Dissertation, University of Wisconsin-Madison.

C.-H. Park, **M. S. Kulie**, and R. Bennartz, 2009: Assimilation of radar observations in mesoscale models using approximate background error covariance matrices. AMS 34th Conference on Radar Meteorology, Williamsburg, VA, 4-9 October 2009. Proceedings.

Kulie, M. S., and R. Bennartz, 2007: Remote sensing of precipitation at higher latitudes using combined active and passive microwave observations. *Joint 2007 EUMETSAT Meteorological Satellite Conference and the 15th Satellite Meteorology and Oceanography Conference of the American Meteorological Society*, Amsterdam, the Netherlands, 24-28 September 2007. Proceedings.

Kulie, M. S., S. A. Ackerman, and R. Bennartz, 2007: Integrating web-based technological classroom tools into an undergraduate radar and satellite meteorology course. *AMS 16th Symposium on Education*, San Antonio, TX, 14-18 January 2007. Proceedings.

Kulie, M. S. and R. Bennartz, 2006: Remote sensing of frozen precipitation at mid- to high-latitudes using combined active and passive microwave instruments. *2006 Wisconsin Space Conference*, Milwaukee, WI, 10-11 August 2006. Proceedings.

Hoch, J., G. Tripoli, and **M. Kulie**, 2005: Sensitivity of space-based precipitation measurements to changes in mesoscale features. *AMS 11th Conf. on Mesoscale Processes and 32nd Conf. on Radar Meteor.*, Albuquerque, NM, 23-29 October 2005.

Tokay, A., R. Meneghini, J. Kwiatkowski, E. Amitai, T. Kozu, T. Iguchi, C. Williams, **M. Kulie**, and C. Wilson, 2001: On the Role of Drop Size Distribution in TRMM Rain Profiling Algorithm. *AMS 30th Inter. Conf. on Radar Meteor.*, Munich, Germany, 2001. Proceedings.

Amitai, E., D. B. Wolff, M. Robinson, D. S. Silberstein, D. A. Marks, **M. S. Kulie**, and B. Fisher, 2001: Methodologies for Evaluating the Accuracy of TRMM Ground Validation Rainfall Products. *AMS 30th Inter. Conf. on Radar Meteor.*, Munich, Germany, 2001. Proceedings.

Kulie, M. S., M. Robinson, D. A. Marks, B. S. Ferrier, D. Rosenfeld, and D. B. Wolff, 1999: Operational Processing of Ground Validation Data for the Tropical Rainfall Measuring Mission. *AMS 29th Inter. Conf. on Radar Meteor.*, Montreal, Canada, 1999. Proceedings.

Marks, D. A., **M. S. Kulie**, M. Robinson, B. S. Ferrier, and E. Amitai, 1999: Standard Reference Rainfall Products Used in the Tropical Rainfall Measuring Mission Ground Validation Efforts. *AMS 29th Inter. Conf. on Radar Meteor.*, Montreal, Canada, 1999. Proceedings.

Robinson, M., D. A. Marks, **M. S. Kulie**, and B. S. Ferrier, 1999: Seasonal Characteristics of Non-Meteorological Radar Reflectivity Returns in East Central Florida and Their Impact on TRMM Ground Validation. *AMS 29th Inter. Conf. on Radar Meteor.*, Montreal, Canada, 1999. Proceedings.

Kulie, M. S., Y.-L. Lin, R. L. Deal, and D. S. Decroix, 1996: A Cloud-Scale Numerical Simulation of the 28 November 1988 Raleigh Tornadoic Thunderstorm. *AMS 18th Conf. on Severe Local Storms*, San Francisco, CA, 1996. Proceedings.

Deal, R. L., Y.-L. Lin, **M. S. Kulie**, and D. S. Decroix, 1996: The Numerical Simulation of a Long-Lived Tornadoic Storm: The 27 March 1994 Cherokee County, Alabama Supercell. *AMS 18th Conf. on Severe Local Storms*, San Francisco, CA, 1996. Proceedings.

Kulie, M. S., 1996: The Structure and Evolution of a Numerically Simulated High-Precipitation Supercell Thunderstorm. M.S. Thesis, North Carolina State University.

Scientific Presentations (First Author Only)

“A global perspective of shallow snowfall in the pre-GPM era.” *2014 Precipitation Measurement Missions Science Team Meeting*. Baltimore, MD, August 2014. (Poster)

“Snowfall mode partitioning using spaceborne radar observations.” *7th International Conference on the Global Water and Energy Cycle*, The Hague, Netherlands, July 2014. (Poster)

“Improving lake effect snow nowcasting and quantitative precipitation estimation using synergistic satellite and NEXRAD products.” *22nd U.S./Canada Great Lakes Operational Meteorology Workshop*, Ann Arbor, MI, May 2014. **(Oral)**

“Improving lake effect snow nowcasting and quantitative precipitation estimation using synergistic satellite and NEXRAD products.” *4th Conference on Transition of Research to Operations*, Boston, MA, February, 2014. **(Oral)**

“Improving GPM-Era higher latitude precipitation retrievals using enhanced microphysical modeling tools and multi-frequency radar observations”, *2013 PMM Science Team Meeting*, Annapolis, MD, 18-21 March 2013 **(Oral)**.

“Leveraging currently available spaceborne microwave observational datasets for GPM-related algorithm development purposes.” *American Geophysical Union Fall 2013 Meeting*, San Francisco, CA, 3-7 December 2013. **(Oral)**

“Constraining Ice Microphysically-Induced Uncertainties Associated with Microwave Precipitation Retrievals at Higher Latitudes.” University of Illinois at Urbana-Champaign Department of Atmospheric Sciences, 12 September 2012. **(Invited talk)**

“The sensitivity of combined multi-frequency radar and passive microwave signatures to snow microphysical modeling assumptions and implications for spaceborne snowfall retrievals.” *AMS 35th Conference on Radar Meteorology*, Pittsburgh, PA, Boston, MA, 26-30 September 2011. **(Oral)**

“Snowfall properties observed by ground-based cloud radars.” *AMS 35th Conference on Radar Meteorology*, Pittsburgh, PA, Boston, MA, 26-30 September 2011. (Poster)

“The sensitivity of combined passive microwave and multi-frequency radar signatures to microphysical assumptions.” *American Geophysical Union Fall 2010 Meeting*, San Francisco, CA, 12-17 December 2010. **(Oral)**

“Microwave remote sensing of higher latitude precipitation using combined active and passive spaceborne instruments.” National Center for Atmospheric Research (NCAR) Research Applications Laboratory Seminar Series, 12 November 2010. **(Invited talk)**

“Utilizing spaceborne radars to retrieve dry snowfall from a global and regional perspective.” *AMS 34th Conference on Radar Meteorology*, Williamsburg, VA, 4-9 October 2009. **(Oral)**

“Uncertainties in simulated Z-S relationships due to ice particle model and particle size distribution variations with application to active spaceborne remote sensing of snowfall.” *AMS 34th Conference on Radar Meteorology*, Williamsburg, VA, 4-9 October 2009. (Poster)

“A multi-sensor strategy to investigate precipitation at higher latitudes.” *AMS 12th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS)*, New Orleans, LA, 20-24 January 2008. **(Oral)**

“Utilizing UNIDATA’S Integrated Data Viewer as an Undergraduate Meteorology Classroom Tool.” *AMS 17th Symposium on Education*, New Orleans, LA, 20-24 January 2008. **(Oral)**

“Remote sensing of precipitation at higher latitudes using combined active and passive microwave observations.” *Joint 2007 EUMETSAT Meteorological Satellite Conference and the 15th Satellite*

Meteorology and Oceanography Conference of the American Meteorological Society, Amsterdam, the Netherlands, 24-28 September 2007. (Oral)

“Integrating web-based technological classroom tools into an undergraduate radar and satellite meteorology course.” *AMS 16th Symposium on Education*, San Antonio, TX, 14-18 January 2007 **(Oral)**

“Remote sensing of frozen precipitation at mid- to high-latitudes using combined active and passive microwave instruments.” *2006 Wisconsin Space Conference*, Milwaukee, WI, 10-11 August 2006. **(Oral)**

“Microwave remote sensing of lake-induced snowfall: Observation, modeling, and cloud microphysical implications”. *AMS 12th Conference on Atmospheric Radiation*, Madison, WI, 9-14 July 2006. (Poster)

“Microwave remote sensing of lake-induced snowfall: Observation, modeling, and cloud microphysical implications”. *2006 American Geophysical Union Joint Assembly*, Baltimore, MD 23-26 May 2006. (Poster)

“AMSR-E Validation of Winter Precipitation Over the Baltic Sea.” *2005 American Geophysical Union Joint Assembly*, New Orleans, LA, 23-27 May 2005. (Poster)

2000 American Geophysical Union Joint Assembly, Washington D.C., 2000. (Poster)

“Operational Processing of Ground Validation Data for the Tropical Rainfall Measuring Mission.” *AMS 29th Inter. Conf. on Radar Meteor.*, Montreal, Canada, 1999. **(Oral)**

National Climatic Data Center WSR-88D Data Workshop, Asheville, NC, 1999. **(Oral)**

TRMM Ground Validation Presentation for Houston-Galveston NWS, 1999 **(Invited talk)**

“A cloud-scale numerical simulation of the 28 November 1988 Raleigh tornadic thunderstorm.” *AMS 18th Conference on Severe Local Storms*, San Francisco, CA, 1996. **(Oral)**

“A numerical simulation of the Raleigh tornadic thunderstorm.” *Southeast Consortium on Severe Thunderstorms and Tornadoes*, Raleigh, NC, 1995. **(Oral)**

Research Grants (Funded)

“Improving Our Understanding of Global Snowfall Using CloudSat and Complementary A-Train Observations.” NASA CloudSat and CALIPSO Science Team Recompete. Principal Investigator. \$441,006. Selected for funding.

“Collaborative Research: Understanding the roles of atmospheric structure and clouds on the radiation and precipitation budgets at Summit, Greenland.” National Science Foundation. Co-Investigator. \$258,712.

“Improving GPM-Era Higher Latitude Precipitation Retrievals Using Enhanced Microphysical Modeling Tools and Multi-Frequency Radar Observations.” NASA Precipitation Measurement Mission Science Team. 2013-2016. Principal Investigator. \$372,338.

“Snowfall from Space: A Synergistic Multi-Sensor Strategy to Improve Spaceborne Snowfall Estimates Using NASA Microwave Sensors and Ground-Based Instruments”. 2012-2015. Principal Investigator. \$359,206.

“Using GOES and NEXRAD Data to Improve Lake Effect Snowfall Estimates.” National Oceanic and Atmospheric Administration GOES Improved Measurement Product Assurance Plan. 2012-2014. Principal Investigator. \$110,000.

“High Latitude Precipitation Studies Using Combined Active and Passive Microwave Satellite Observations.” NASA Precipitation Science Program. 2010-2013. Co-Investigator.

Research Grants (In Review)

“The Superior Cloud-Aerosol-Precipitation Experiment.” Atmospheric Radiation Measurement Climate Mobile Facility Deployment Proposal. Department of Energy. Principal Investigator.

Field Experiments

PMM-GCPEX:	Barrie, Ontario, Canada (Operations Scientist – Radar)
TRMM-LBA:	Rondonia, Brazil (Tethersonde and radiosonde operations)
TRMM-KWAJEX:	Kwajalein Atoll, Marshall Islands (Radiosonde/rain gauge operations)

Professional Memberships and Activities

American Meteorological Society
American Geophysical Union

Service

Associate Editor: Atmospheric Measurement Techniques (2014-present)

Editorial Assistant: Journal of Applied Meteorology and Climatology (2004-2010)

Co-chair:

International Workshop on Space-based Snowfall Measurement Working Group on Applications and Validation (2013)

Session Chair:

American Meteorological Society 34th Conference on Radar Meteorology (2009)

American Meteorological Society 35th Conference on Radar Meteorology (2011)

Reviewer:

Journal of Applied Meteorology and Climatology, Journal of Geophysical Research, Journal of Atmospheric and Oceanic Technology, IEEE Transactions on Geoscience and Remote Sensing

Faculty search committee member

University of Wisconsin-Madison AOS

Colloquium committee member

University of Wisconsin-Madison AOS

Graduate Student Association member and co-founder
University of Wisconsin-Madison AOS

Graduate student faculty liaison
University of Wisconsin-Madison AOS

Public Education Outreach
Numerous K-12 schools in the Madison and northern Michigan regions