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MATTHEW D. SHUPE

Senior Research Scientist
Cooperative Institute for Research in Environmental Sciences
University of Colorado and
NOAA Physical Sciences Laboratory
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EDUCATION:

University of Colorado, Ph.D 2007, M.S. 2006
Astrophysical, Planetary, and Atmospheric Sciences
University of Puget Sound, B.S. Summa Cum Laude 1997,
Chemistry with atmospheric sciences focus, second major Mathematics

PROFESSIONAL APPOINTMENTS:

Cooperative Institute for Research in Environmental Sciences, University of Colorado and NOAA/ESRL; Senior research scientist, 2018-present
Cooperative Institute for Research in Environmental Sciences, University of Colorado and NOAA/ESRL; research scientist III, 2012-2018
Cooperative Institute for Research in Environmental Sciences, University of Colorado and NOAA/ESRL; research scientist II, 2008-2012
Cooperative Institute for Research in Environmental Sciences, University of Colorado and NOAA/ESRL; associate scientist II/III, 2004-2008
Science and Technology Corporation and NOAA-Environmental Technology Laboratory, research scientist; 1998 – 2004
Battelle Corporation and Pacific Northwest National Laboratory, Research Assistant; June – August, 1996

RESEARCH AREAS:

Cloud microphysical, radiative, and dynamical properties and processes; cloud interactions with boundary layer and surface; cloud property retrievals and validation; assessment of cloud model parameterizations; cloud type classification; atmospheric radiation; surface energy budget; atmospheric boundary layer processes; Arctic meteorology and climate.

FIELD EXPERIENCE:

Sept-Dec 2019, May-Aug 2020: MOSAiC campaign, Arctic Ocean
July 2018: POPEYE campaign, Oliktok Point, Alaska
October 2016: ICARUS campaign, Oliktok Point, Alaska
July-Aug 2014: Arctic Clouds in Summer Experiment (ACSE), Arctic Ocean
Nov. 2010-Mar. 2011: Storm Peak Validation Experiment (StormVex), Colorado
2009-Present: ICECAPS, Summit Station, Greenland
August-Sept 2008: Arctic Summer Cloud Ocean Study (ASCOS), Arctic Ocean

August 2007: SEARCH project deployment and maintenance, Eureka, Canada
May 2006: SEARCH project deployment and maintenance in Eureka, Canada
July 2005: SEARCH project deployment in Eureka, Canada
October 2004: Mixed-Phase Arctic Clouds Experiment in Barrow, Alaska
July 2002: NASA-FIRE CRYSTAL- Florida Area Cirrus Experiment (South Florida)
Jan. 2000-Feb. 2000: High Altitude Weather Characterization Experiment (Boston)
March 1999: NOAA/ETL depolarization lidar (DABUL) in Barrow, Alaska.
Nov. 1997 – Oct. 1998: Surface Heat Budget of the Arctic Program (Arctic Ocean)

HONORS AND AWARDS:

Finalist, IASC Medal, 2022, 2023
Arctic Circle Prize, 2022, MOSAiC group award
CIRES Photo contest winner, 2022
NOAA Bronze Award (MOSAiC), 2022
NOAA Bronze Award (CAFS Model), 2021
CIRES Outstanding Performance Award (MOSAiC communications), 2021
Mercator Fellowship (Germany), 2020-2023
NOAA Outstanding Scientific Paper Award, 2010
NOAA-ETL Employee of the Month, June 2005
NASA Group Achievement Award, 2002
University of Puget Sound: Graduated Summa Cum Laude (1997), Graduated with Honors in Mathematics (1997), Campus Leadership Award (1997), Dean's List (1992, 1994-1997), Trustee Scholarship for academic performance (1992-1997), Hearst Writing Award for mathematical modeling paper (1996), Fehlandt Scholarship Award for outstanding chemistry student (1996), Hunter Memorial Scholarship for highest fraternity GPA (1994-1996), Goman Scholarship for outstanding mathematics student (1995-1996), Chemistry Dept. Scholarship for outstanding chemistry student (1995), Merck Index Award for outstanding organic chemistry student (1995), Murdock Research Grant (1995)

GRANTS FUNDED

"Using Radar, Lidar, and Radiometer Data from NSA and SHEBA to Quantify Cloud Property Effects on the Arctic Surface Heat Budget," Janet Intrieri (PI) and Matthew Shupe (Co-PI), Department of Energy, Atmospheric Radiation Measurement Program, 2002-2004, $209,400.

"An Investigation of the Microphysical, Radiative, and Dynamical Properties of Mixed-Phase Clouds," Matthew Shupe (PI) and Pavlos Kollias (Co-PI), Department of Energy, Atmospheric Radiation Measurement Program, 2005-2007, $100,800.

"Collaborative Research: IPY: Cloud properties across the Arctic Basin from surface and satellite measurements – An existing Arctic Observing network," Matthew Shupe (PI), National Science Foundation, 2007-2009, $184,340.

"Investigations of the Microphysical, Radiative, and Dynamical Properties of Mixed-Phase Clouds," Matthew Shupe (PI), Department of Energy, Atmospheric Radiation Measurement Program, 2008-2010, $338,635.

"Collaborative Research: Integrated Characterization of Energy, Clouds, Atmospheric State, and Precipitation at Summit (ICECAPS)," Matthew Shupe (PI), National Science Foundation, 2009-2014, $694,492.

"Collaborative Research: Colorado Airborne Multi-Phase Cloud Study (CAMPS)," Linnea Avallone (PI), Matthew Shupe (PI), National Science Foundation, 2010-2012, $504,080.

"Collaborative Research: Understanding and Modeling Key Arctic Cloud-ABL-Surface Processes and Interactions," Ola Persson (PI), Matthew Shupe (Co-PI), National Science Foundation, 2010-2013, $664,741.

"Investigations of Mixed-Phase Cloud Microphysical Radiative and Dynamical Processes," Matthew Shupe (PI), Department of Energy, Atmospheric Radiation Measurement Program, 2011-2014, $531,645.

"A Multi-Faceted Evaluation of Aerosol Impacts on Arctic Clouds," Gijs de Boer (PI), Matthew Shupe (Co-PI), National Science Foundation, 2012-2015, $289,454.

"Evaluating Aerosol Indirect Effects in Mixed-Phase Clouds using ARM Observations," Gijs de Boer (PI), Matthew Shupe (Co-PI), Department of Energy, Atmospheric Radiation Measurement Program, 2012-2015, $284,261.

"Collaborative Research: Integrated Characterization of Energy, Clouds, Atmospheric State, and Precipitation at Summit (ICECAPS)," Matthew Shupe (PI), National Science Foundation, 2013-2018, $741,954.

"Collaborative Research: Characterizing the Roles of Atmospheric Structure and Clouds on the Radiation and Precipitation Budgets at Summit, Greenland," Matthew Shupe (PI), National Science Foundation, 2013-2016, $455,714.

"High Resolution, Active Remote Sensing of Cloud Microphysics at Summit, Greenland with Polarized Raman Lidar," Ryan Neely (PI), Matthew Shupe (Co-PI), National Science Foundation, 2013-2018, $1,525,726.

"Investigations of the Arctic mixed-phase cloud lifecycle: Microphysics, Dynamics, and Persistence," Matthew Shupe (PI), Department of Energy, Atmospheric System Research Program, 2014-2016, $400,047

"Collaborative Research: Thermodynamic and dynamics drivers of the Arctic sea-ice mass budget at MOSAiC," Matthew Shupe (PI), National Science Foundation, 2017-2021, $1,774,584.

"NNA: NSFGEO-NERC: Collaborative Research: The Integrated Characterization of Energy, Clouds, Atmospheric State, and Precipitation at Summit, Aerosol-Cloud Experiment (ICECAPS-ACE)," Matthew Shupe (PI), National Science Foundation, 2018-2022, $270,514.

"The MOSAiC Atmosphere: Atmospheric Science and Surface Coupling at the Multidisciplinary drifting Observatory for the Study of Arctic Climate," Matthew Shupe (PI), Department of Energy, Atmospheric Radiation Measurement Program, 2018-2019, field operation of ARM mobile facility.

"Enhanced atmospheric research at the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC)," Matthew Shupe (PI), Department of Energy, Atmospheric System Research Program, 2018-2022, $442,381.

"Enhancing the value of MOSAiC through coordination and outreach," Matthew Shupe (PI), National Science Foundation, 2018-2022, $1,020,373.

"Cloud-atmosphere impacts on the Arctic surface energy budget," Matthew Shupe (PI), Department of Energy, Atmospheric System Research Program, 2020-2023, $821,680.

"Collaborative Research: NSFGEO-NERC: Integrated Characterization of Energy, Clouds, Atmospheric state, and Precipitation at Summit: Measurements Along Lagrangian Transects," Matthew Shupe (PI), National Science Foundation, 2021-2024, $847,999.

"MOSAiC Workshop Support," Matthew Shupe (PI), Department of Energy, Atmospheric System Research Program, 2022-2023, $24,989.

SCIENCE LEADERSHIP, COMMITTEES AND ASSOCIATIONS:

NOAA, Earth System Research Laboratory, Physical Sciences Division
- Polar Observations and Processes, team co-lead, 2014-2019
- PSD Research Council member, 2014-2019

Department of Energy
- ASR/ARM Science Team member, 2002-present
- ARM Sunset Committee member, 2006-2009
- ARM Cloud Properties Working Group, Mixed-phase chair, 2006-2008
- ARM Cloud Properties Working Group, Steering committee, 2006-2008
- ARM Cloud Properties Working Group, Chair, 2008-2009
- ASR Cloud Life Cycle Working Group, Co-Chair, 2009-2015
- ARM Science and Infrastructure Steering Committee, 2008-2015
- ARM Climate Research Facility Science Board, 2009-2011, 2013
- ARM Radar Science Committee, 2013-2015
- ARM User Executive Committee, 2015-2018
- Biological and Environmental Research Advisory Committee, 2017-present

Member American Geophysical Union

Member American Meteorological Society

AMS Polar Meteorology and Oceanography Committee, 2006 – 2011

NSF Facilities Assessment, Surface-based remote sensing subcommittee, 2007 – 2008

NSF Arctic Observing Network Science Team member, 2007 – present

Study of Environmental Arctic Change, Observing Change Panel, 2013-2018

AC3 German transregional consortium, Science Advisory Board, 2016-2017

AC3 German transregional consortium, Associate Member, 2017 – present

Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC), co-coordinator, 2011-present

WMO Year of Polar Prediction, verification working group, 2017 – 2022

SERVICE

Research Advisor –
- Samuel Dorsi, Univ. of Colorado, post-doctoral advisor, 2013-2014
- Michael Gallagher, Univ. of Colorado, post-doctoral advisor, 2019-2021
- Anne Sledd, Univ. of Colorado, post-doctoral advisor, 2021-present
- Ulrike Egerer, Univ. or Colorado, post-doctoral advisor, 2021-2022

Ben Castellani, Univ. of Colorado, ATOC, M.D. advisor, 2011-2014
Nathaniel Miller, Univ. of Colorado, ATOC, Ph.D advisor, 2013-2017
Michael Stone, Univ. of Colorado, ATOC, Ph.D advisor, 2014-2019
Gregory Seroka, NOAA Hollings Scholar Program, 2007
Elizabeth Maroon, NOAA Hollings Scholar Program, 2009
Lucien Simpfendoerfer, NOAA Hollings Scholar Program, 2016
Samuel Dorsi, Univ. of Colorado, ATOC, Ph.D committee member, 2011
Christopher Cox, Univ. of Idaho, Env. Sci., Ph.D committee member, 2012-2013
Tomoko Koyama, Univ. of Colorado, ATOC, Ph.D committee member, 2014-2018
Ariel Morrison, Univ. of Colorado, ATOC, Ph.D committee member, 2016-2018
Matthew Norgren, Univ. of Colorado, ATOC, Ph.D. committee member, 2017-2021
Rosa Geirens, Univ. of Cologne, Ph. D committee member, 2016-2021
Drew Camron, Univ. of Colorado, ATOC, Ph. D committee member, 2018
Gina Jozef, Univ. of Colorado, ATOC, Ph. D committee member, 2021-2023
Will Betrand, Univ. of Colorado, ATOC, Ph. D committee member, 2023-present
Jean Lac, Sarbonne University, Ph. D committee member, 2023-present
Heike Kalesse, TROPOS Inst., Leibniz Mentorship program mentor, 2014-2016
Devon Dunmire, Colorado School of Mines, Senior Design Project mentor, 2017-2018

Instructor – U. of Colorado independent study, Cassandra Wheeler, 2008
NOAA-ESRL Workplace Advisory Committee, 2006-2007
NOAA-ESRL Computer Users Advisory Committee, 2007-2010
CIRES Career Track Promotion committee, 2019
CIRES Strategic Planning committee, 2021-2022
Polar Science Early Career Community Office, advisory board member, 2022 - present
Organizing Committee: NSF Arctic Research Support and Logistics Workshop 2013
Organizing Committee: U.S. Arctic Observing Open Science Meeting 2015
Journal reviewer: Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Atmospheric Research, Bulletin of the American Meteorological Society, Elementa, Geophysical Research Letters, International Journal of Climatology, Journal of Applied Meteorology, Journal of Applied Meteorology and Climatology, Journal of Climate, Journal of Geophysical Research, Journal of Hydrometeorology, Monthly Weather Review, Nature, Nature Climate Change, Nature Communications, Quarterly Journal of the Royal Meteorology Society, Radio Science, Remote Sensing of the Environment, Science, Scientific Reports, The Cryosphere,
Proposal reviewer: National Environmental Research Council (U.K.), U.S. National Science Foundation, US National Aeronautics and Space Agency, Natural Sciences and Engineering Research Council of Canada, U.S. Department of Energy, Swedish Wallenberg Foundation, Swedish Formas Agency, German Leibniz Foundation
Book reviewer: Cambridge University Press
Guest editor: Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Elementa

REFEREED PUBLICATIONS:

Total publications: 152

Hersh Index: 52

Papers with >100 citations: 23

Shupe, M.D., T. Uttal, S.Y. Matrosov, and A.S. Frisch, 2001: Cloud water contents and hydrometeor sizes during the FIRE-Arctic Clouds Experiment. *J. Geophys. Res.*, **106**, 15,015-15,028.

Hobbs, P.V., A.L. Rangno, **M.D. Shupe**, and T. Uttal, 2001: Airborne studies of cloud structures over the Arctic Ocean and comparisons with deductions from ship-based 35 GHz radar measurements. *J. Geophys. Res.*, **106**, 15 029-15 044.

Minnis, P., D.R. Doelling, V. Chakrapani, D.A. Spangenberg, L. Nguyen, R. Palikonda, T. Uttal, R.F. Arduini, and **M.D. Shupe**, 2001: Cloud coverage during FIRE ACE derived from AVHRR data. *J. Geophys. Res*., **106**, 15,215-15,232.

Khvorostyanov, V.I., J.A. Curry, J.O. Pinto, **M.D. Shupe**, B.A. Baker, and K. Sassen, 2001: Modeling with explicit spectral water and ice microphysics of a two-layer cloud system of altostratus and cirrus observed during the FIRE Arctic Clouds Experiment. *J. Geophys. Res.*, **106**, 15,099-15,112.

Westwater, E.R., Y. Han, **M.D. Shupe**, and S.Y. Matrosov, 2001: Analysis of integrated cloud liquid and precipitable water vapor retrievals from microwave radiometers during SHEBA. *J. Geophys. Res*., **106**, 32,019-32,030.

Uttal, T., and Coauthors (including **M.D. Shupe**), 2002: Surface Heat Budget of the Arctic Ocean. *Bull. Amer. Meteor. Soc.*, 83, 255-276.

Rathke, C., J. Fischer, S. Neshyba, and **M.D. Shupe**, 2002: Improving IR cloud phase determination with 20 microns spectral observations. *Geophys. Res. Let.*, **29**, 50.1-50.4.

Frisch, A.S., **M.D. Shupe**, I. Djalalova, G. Feingold, and M. Poellot, 2002: The retrieval of stratus cloud droplet effective radius with cloud radars. *J. Atmos. Ocean. Tech.*, **19**, 835-842.

Intrieri, J.M., **M.D. Shupe**, T. Uttal, and B.J. McCarty, 2002: Annual Cycle of Arctic Cloud Geometry and Phase from Radar and lidar at SHEBA. *J. Geophys. Res*., **107** (C10), 10.1029/2000JC000423.

Intrieri, J.M., C.F. Fairall, **M.D. Shupe**, P.O.G. Persson, E.L Andreas, P. Guest, and R.M. Moritz, 2002: Annual cycle of cloud forcing over the Arctic. *J. Geophys. Res*., **107** (C10), 10.1029/2000JC000439.

Schweiger, A., R Lindsay, J. Francis, J. Key, J. Intrieri, and **M.D. Shupe**, 2002: Validation of TOVS Path-P data during SHEBA. *J. Geophys. Res*., **107**(C10), 10.1029/2000JC000453.

Rathke, C., S. Neshyba, **M.D. Shupe**, P. Rowe, and A. Rivers, 2002: Radiative and microphysical properties of Arctic stratus clouds from multiangle downwelling infrared radiances, *J. Geophys. Res.*, **107**(D23), 4703, doi: 10.1029/2001JD001545.

Loehnert, U., G. Feingold, T. Uttal, A.S. Frisch, and **M.D. Shupe**, 2003: Analysis of two independent methods to for retrieving liquid water profiles in spring and summer Arctic boundary clouds. *J. Geophys. Res.*, **108**(D7), 4219, doi:10.1029/2002JD002861.

Morrison, H., **M.D. Shupe**, and J.A. Curry, 2003: Modeling clouds observed at SHEBA using a bulk microphysics parameterization implemented into a single-column model. *J. Geophys. Res.*, **108**(D8), 4255, doi:10.1029/2002JD002229.

Matrosov, S.Y., **M.D. Shupe**, A.J. Heymsfield, and P. Zuidema, 2003: Ice cloud optical thickness and extinction estimates from radar measurements. *J. Appl. Meteor.*, **42**, 1584-1597.

Shupe, M.D. and J.M. Intrieri, 2004: Cloud radiative forcing of the Arctic surface: The influence of cloud properties, surface albedo, and solar zenith angle. *J. Climate*, **17**, 616-628.

Shupe, M.D., P. Kollias, S.Y. Matrosov, and T.L. Schneider, 2004: Deriving mixed-phase cloud properties from Doppler radar spectra. *J. Atmos. Ocean. Technol.*, **21**, 705-715.

Intrieri, J.M., and **M.D. Shupe**, 2004: Characteristics and radiative effects of diamond dust over the Western Arctic Ocean region. *J. Climate*, **17**, 2953-2960.

Zuidema, P., B. Baker, Y. Han, J. Intrieri, J. Key, P. Lawson, S. Matrosov, **M.D. Shupe**, R. Stone, and T. Uttal, 2005: An Arctic springtime mixed-phase cloudy boundary layer observed during SHEBA. *J. Atmos. Sci.*, 62, 160-176.

Sassen, K., J.R. Campbell, J. Zhu, P. Kollias, **M.D. Shupe**, and C. Williams, 2005: Lidar and triple-wavelength Doppler radar measurements of the melting layer: A revised model for dark- and brightband phenomena. *J. Appl. Meteor.,* **44**,301-312.

Morrison, H., J.A. Curry, **M.D. Shupe**, and P. Zuidema, 2005: A new double-moment microphysics parameterization, Part 2: Application to Arctic stratiform clouds. *J. Atmos. Sci.*, **62**, 1678-1693.

Morrison, H., **M.D. Shupe**, J.A. Curry, and J.O. Pinto, 2005: Possible roles of ice nucleation mode and ice nuclei depletion in the extended lifetime of arctic mixed-phase clouds. *Geophys. Res. Lett.*, **32**, L18801, doi:10.1029/2005GL023614.

Shupe, M.D., T. Uttal, and S.Y. Matrosov, 2005: Arctic cloud microphysics retrievals from surface-based remote sensors at SHEBA. *J. Appl. Meteor.,* **44**, 1544-1562.

Shupe, M.D., S.Y. Matrosov, and T. Uttal, 2006: Arctic mixed-phase cloud properties derived from surface-based sensors at SHEBA. *J. Atmos. Sci.*, **63**, 697-711.

Daniel, J.S., R.W. Portman, H.L. Miller, S. Solomon, A.L. Langford, C.E. Eubank, R. Schofield, D.D. Turner, and **M.D. Shupe**, 2006: Cloud property estimates from zenith spectral measurements of scattered sunlight between 0.9 and 1.7 um. *J. Geophys. Res.*, **111**, D16208, doi:10.1029/2005JD006641.

Matrosov, S.Y., P.D. May, and **M.D. Shupe**, 2006: Rainfall profiling using Atmospheric Radiation Measurement Program's vertically pointing 8-mm wavelength radars. *J. Atmos. Ocean. Tech.* **23**, 1478-1491.

Verlinde, J., and Coauthors (including **M.D. Shupe**), 2007: The Mixed-Phase Arctic Cloud Experiment (M-PACE). *Bull. Amer. Met. Soc.*, **88**, 205-220.

Comstock, J.M., and Coauthors (including **M.D. Shupe)**, 2007: An intercomparison of microphysical retrieval algorithms for upper tropospheric ice clouds. *Bull. Amer. Met. Soc.*, **88**, 191-204.

Schofield, R., J.S. Daniel, R.W. Portmann, H.L. Miller, S. Solomon, C.S. Eubank, M.L. Melamed, A.O. Langford, and **M.D. Shupe**, 2007: Retrieval of effective radius and liquid water path from ground-based instruments: A case study at Barrow, Alaska. *J. Geophys. Res.*, 112, D21203, doi:10.1029/2007JD008737.

Shupe, M.D., 2007: A ground-based multiple remote-sensor cloud phase classifier. *Geophys. Res. Lett.*, 34, L22809, doi:10.1029/2007GL031008.

Matrosov, S.Y., **M.D. Shupe**, and I.V. Djalalova, 2008: Snowfall retrievals using millimeter-wavelength cloud radars. *J. Appl. Meteor. Clim.*, 47, 769-777.

Shupe, M.D., P. Kollias, M. Poellot, and E. Eloranta, 2008: On deriving vertical air motions from cloud radar Doppler spectra. *J. Atmos. Ocean. Techn.*, 25, 547-557.

Shupe, M.D., P. Kollias, P.O.G. Persson, and G. M. McFarquhar, 2008: Vertical motions in Arctic mixed-phase stratiform clouds. *J. Atmos. Sci.*, 65, 1304-1322.

Tjernstrom, M., J. Sedlar, and **M.D. Shupe**, 2008: How well do regional climate models reproduce radiation and clouds in the Arctic? An evaluation of ARCMIP simulations. *J. Appl. Met. Clim*., 47, 2405-2422.

Shupe, M.D., J.S. Daniel, G. De Boer, E.W. Eloranta, P. Kollias, E. Luke, C.N. Long, D. D. Turner, and J. Verlinde, 2008: A focus on mixed-phase clouds: The status of ground-based observational methods. *Bull. Amer. Meteor. Soc.*, 87, 1549-1562.

Klein, S.A., and Coauthors (including **M. D. Shupe**), 2009: Intercomparison of model simulations of mixed-phase clouds observed during the ARM Mixed-Phase Arctic Cloud Experiment. Part I: Single layer cloud. *Quart. J. Roy. Meteor. Soc*., 135, doi: 10.1002/qj.416.

Morrison, H., and Coauthors (including **M. D. Shupe**), 2009: Intercomparison of model simulations of mixed-phase clouds observed during the ARM Mixed-Phase Arctic Cloud Experiment. Part II: Multi-layered cloud. *Quart. J. Roy. Meteor. Soc*., 135, 1003-1019.

de Boer, G., E.W. Eloranta, and **M. D. Shupe**, 2009: Arctic mixed-phase stratiform cloud properties from multiple years of surface-based measurements at two high-latitude locations. *J. Atmos. Sci.*, 66, 2874-2887.

Solomon, A., H. Morrison, O. Persson, **M.D. Shupe** and J.-W. Bao, 2009: Investigation of microphysical parameterizations of snow and ice in Arctic clouds during M-PACE through model-observation comparison. *Mon. Wea. Rev*., 137, 3110-3128.

Dong, X., B. Xi, K. Crosby, C.N. Long, R.S. Stone, and **M.D. Shupe**, 2010: A 10-year climatology of Arctic cloud fraction and radiative forcing at Barrow, Alaska. *J. Geophys. Res.*, 115, D17212, doi: 10.1029/2009JD013489.

Luke, E., P. Kollias, and **M.D. Shupe**, 2010: Detection of supercooled liquid in mixed-phase clouds using radar Doppler spectra. *J. Geophys. Res.*, 115, D19201, doi:10.1029/2009JD012884.

de Boer, G., H. Morrison, **M.D. Shupe**, and R. Hildner, 2011: Evidence of liquid dependent ice nucleation in high-latitude stratiform clouds from surface remote sensors. *Geophys. Res. Lett*., 38, L01803, doi:10.1029/2010GL046016.

Mauritsen, T., and Coauthors (including **M. D. Shupe)**, 2011: An Arctic CCN-limited cloud-aerosol regime. *Atmos. Chem. Phys.*, 11, 165-173.

McFarquhar, G.M., and Coauthors (including **M. D. Shupe**), 2010: Indirect and Semi-Direct Aerosol Campaign (ISDAC): The impact of Arctic aerosols on clouds. *Bull. Amer. Meteor. Soc*., 92, 183-201.

Shupe, M.D., V.P. Walden, E. Eloranta, T. Uttal, J.R. Campbell, S.M. Starkweather, and M. Shiobara, 2011: Clouds at Arctic Atmospheric Observatories, Part I: Occurrence and macrophysical properties. *J. Appl. Meteor. Clim*., 50, 626-644.

Shupe, M.D., 2011: Clouds at Arctic Atmospheric Observatories, Part II: Thermodynamic phase characteristics. *J. Appl. Meteor. Clim*., 50, 645-661.

Du, P., E. Girard, A.K. Bertram, and **M.D. Shupe**, 2011: Modeling of the cloud and radiation processes observed during SHEBA. *Atmos. Res*., 101, 911-927.

Lance, S., and Coauthors (including **M.D. Shupe)**, 2011: CCN as a modulator of ice processes in Arctic mixed-phase clouds. *Atmos. Chem. Phys*., 11, 8003-8015.

Sedlar, J., and Coauthors (including **M.D. Shupe)**, 2010: A transitioning Arctic surface energy budget: the impacts of solar zenith angle, surface albedo and cloud radiative forcing. *Clim. Dyn*., 37, 1643-1660.

Solomon, A., **M.D. Shupe**, P.O.G. Persson, and H. Morrison, 2011: Moisture and dynamical interactions maintaining decoupled Arctic mixed-phase stratocumulus in the presence of a humidity inversion. *Atmos. Chem. Phys.*, 11, 10127-10148.

Morrison, H., G. de Boer, G. Feingold, J. Harrington, **M.D. Shupe**, and K. Sulia, 2012: Self-organization and resilience of Arctic mixed-phase clouds. *Nature Geoscience*, doi: 10.1038/NGE01332.

Fridlind, A.M., B. van Diedenhoven, A.S. Ackerman, A. Avramov, H. Morrison, P. Zuidema, and **M.D. Shupe**, 2012: Entrainment limitations on heterogeneous ice formation: A FIRE-ACE/SHEBA case study of mixed-phase Arctic boundary-layer clouds. *J. Atmos. Sci*. 69, 365-389.

Sedlar, J., **M.D. Shupe**, and M. Tjernstrom, 2012: On the relationship between thermodynamic structure, cloud top, and climate significance in the Arctic. *J. Climate*, 25, 2374-2393.

de Boer, G., W. Chapman, J. Kay, B. Medeiros, **M.D. Shupe**, S. Vavrus, and J. Walsh, 2012: A characterization of the present-day Arctic Atmosphere in CCSM4. *J. Climate*, 25, 2676-2695.

Birch, C. E., and Coauthors (including **M. D. Shupe**), 2012: Modelling atmospheric structure, cloud and their response to CCN in the Central Arctic: ASCOS case studies. Atmos. Chem. Phys., 12, 3419-3435 doi:10.5194/acp-12-3419-2012.

Zhao, C., and Coauthors (including **M. D. Shupe**), 2012: Towards understanding of differences in current cloud retrievals of ARM ground-based measurements. *J. Geophys. Res.*, 117, D10206, doi:10.1029/2011JD016792.

Shupe, M. D., I. Brooks, and G.Canut, 2012: Evaluation of turbulent dissipation rate retrievals from Doppler cloud radar. *Atmos. Meas. Tech.*, 5, 1375-1385.

Tjernstrom, M, and Coauthors (including **M. D. Shupe)**, 2012: Meteorological conditions in the central Arctic summer during the Arctic Summer Cloud Ocean Study (ASCOS). *Atmos. Chem. Phys*., 12, 6863-6889.

Matrosov, S. Y., G. G. Mace, R. Marchand, **M. D. Shupe**, A. G. Haller, and I. B. McCubbin, 2012: Influence of ice hydrometeor habits on scanning polarimetric cloud radar measurements. *J. Atmos. Oceanic. Technol*, 29, 989-1008.

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

Shupe, M. D., and Coauthors, 2013: High and Dry: New observations of tropospheric and cloud properties above the Greenland Ice Sheet. *Bull. Amer. Meteor. Soc*., 94, 169-186, doi:10.1175/BAMS-D-11-00249.1

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.

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