

## **Dr. Matthew J. McGill**

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### **EXPERIENCE & RESEARCH INTERESTS**

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Before moving to the University of Iowa in 2022, Dr. McGill was a member of NASA Goddard Space Flight Center's Earth Sciences Division for 25 years. During that tenure he has conceived and developed instruments, technologies, and algorithms while mentoring students and researchers. Dr. McGill has been directly responsible for development of seven airborne instruments and the Cloud-Aerosol Transport System (CATS) lidar on the International Space Station. From 2019 to 2022, Dr. McGill has served as the Deputy Director of the Earth Sciences Division.

### **RESEARCH FOCUS AREAS**

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Lidar remote sensing, clouds and aerosols, radiative transfer, atmospheric physics, atmospheric dynamics, interferometry, instrument development

### **EDUCATION**

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1996 Ph.D. in Atmospheric Science, The University of Michigan, Ann Arbor, MI.

1994 M.S. in Atmospheric Science, The University of Michigan, Ann Arbor, MI.

1991 B.S. in Physics, Alma College, Alma, MI.

### **PROFESSIONAL EXPERIENCE**

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2022 – Present Professor, Chemical and Biochemical Engineering Department, University of Iowa

2022 Director (acting), Earth Sciences Division, Laboratory for Atmospheres, NASA Goddard Space Flight Center

2019 – 2022 Deputy Director, Earth Sciences Division, Laboratory for Atmospheres, NASA Goddard Space Flight Center

2012 – 2022 Earth Sciences Division Chief Technologist, Laboratory for Atmospheres, NASA Goddard Space Flight Center

1997 – 2012 Physical Scientist, Mesoscale Atmospheric Processes Branch, Laboratory for Atmospheres, NASA Goddard Space Flight Center

1996 – 1997 Research Associate, University of Michigan (assigned to NASA Goddard Space Flight Center), Mesoscale Atmospheric Processes Branch, Laboratory for Atmospheres, NASA Goddard Space Flight Center

1991 – 1996 Research Assistant, University of Michigan, Ann Arbor, MI

### **AWARDS**

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2017 National Organization of Gay and Lesbian Scientists and Technical Professionals – Scientist of the Year

2014 Goddard Innovator of the Year Award

2009 NASA Honor Award for Exceptional Service

- 2008 NASA Group Achievement Award – CALIPSO Validation Team
- 2004 Goddard Group Award – CRYSTAL-FACE ER-2 Team
- 2000 GSFC James J. Kerley Award for Technology Commercialization and Tech Transfer
- 2000 Goddard Group Award – Cloud Physics Lidar Development Team

### **PROFESSIONAL SOCIETY MEMBERSHIPS**

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- American Geophysical Union, Member
- American Meteorological Society, Member

### **SPECIAL EXPERIENCE**

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- 1) **Adjunct Professor**, University of Maryland College Park, research advisor and thesis committee for Dr. John Yorks, 2009-2014, thesis title “An investigation of cirrus cloud properties using airborne lidar”
- 2) **Adjunct Professor**, University of Maryland College Park, research advisor and thesis committee for Dr. Scott Ozog, 2014-2019, thesis title “The diurnal and seasonal radiative effects of cirrus clouds utilizing large airborne and space-borne lidar data sets”
- 3) **Co-Investigator**, CPL participation in the Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS) Earth Venture Suborbital (EVS-3) field campaign, 2019-2023
- 4) **Principal Investigator**, funded to develop \$1M Roscoe airborne lidar sensor, 2017-*present*
- 5) **Principal Investigator** and **Project Manager**, funded to develop \$15M Cloud-Aerosol Transport System for International Space Station (CATS-ISS), 2011-2018
- 6) **Member**, Aerosol-Clouds-Ecosystems (ACE) Science Working Group, 2007-2017
- 7) **Member**, CALIPSO science team, 2007-2019
- 8) **Member**, GSFC Gay, Lesbian, Bisexual and Transgender Advisory Committee, 2005-*present*
- 9) **Member** and Influence Leader, GSFC Code 600 Diversity Team, 2007-2018
- 10) Received GSFC’s Innovator of the Year Award, 2014
- 11) **Instrument Scientist**, ICESat-2 Mission, 2009-2011
- 12) **Principal Investigator**, directed to develop \$2.5M Multiple Beam Altimeter Experiment Lidar (MABEL) as ICESat-2 demonstrator instrument, 2009-2012
- 13) **Principal Investigator** funded to develop \$3M Airborne Cloud-Aerosol Transport System (A-CATS) airborne lidar, 2009-2012
- 14) **Principal Investigator** funded to demonstrate UAV-based lidar instrumentation (GloPac), 2007-2010
- 15) **Principal Investigator** funded to develop \$2M UAV-based lidar instrument, 2004-2006
- 16) **Co-Investigator** responsible for assembly and integration of \$3M TWiLiTE instrument, 2007-2009
- 17) **Co-Investigator** funded to provide airborne lidar measurements for Hurricane and Severe Storms Sentinel (HS3) Venture Class Mission, 2010-2015
- 18) **Co-Investigator** funded to provide airborne lidar measurements for Airborne Tropical Tropopause Experiment (ATTREX) Venture Class Mission, 2010-2015

- 19) **Co-Principal Investigator** funded by NASA Radiation Science Program for MIDAS combined active-passive remote sensing studies, 2003-2009
- 20) **ESSP Mission Scientist** for CloudSat Mission, 2000-2005
- 21) **ESSP Mission Scientist** for Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO) Mission, 2000-2005
- 22) **Principal Investigator** funded to develop cloud-aerosol transport lidar, 2008-2011
- 23) **Principal Investigator** funded for airborne lidar measurements during TC4, 2007
- 24) **Principal Investigator** funded to coordinate and effect CALIPSO validation measurements (CC-VEX), 2006
- 25) **Principal Investigator** funded for airborne lidar measurements during CRYSTAL-FACE, 2002-2003
- 26) **Principal Investigator** funded for airborne lidar measurements during THORPEX-AT, 2003
- 27) **Principal Investigator** funded for airborne lidar measurements during THORPEX-PT, 2003
- 28) **Co-Investigator** funded for airborne lidar measurements during SAFARI-2000 field campaign, August-September 2000
- 29) **Principal Investigator** funded by GSFC Technology Commercialization Office to demonstrate Doppler lidar measurements, 2002-2003
- 30) Member, NASA Technical Assessment Team for Doppler lidar, 2001-2010
- 31) **Principal Investigator** funded by GSFC-DDF to develop holographic Fabry-Perot etalons, 2001-2002
- 32) **Co-Principal Investigator** funded to develop new Thickness from Offbeam Returns (THOR) lidar, 2001-2004
- 33) **Principal Investigator** funded by NOAA-ETL to provide simulations of spaceborne Doppler lidar, 2001
- 34) Awarded US Patent #6313908, "Apparatus and method using a holographic optical element for converting a spectral distribution to image points," 2001
- 35) Member, NOAA-ETL Technical Assessment Advisory Committee for Doppler lidar, 2000-2010
- 36) Initiated educational outreach initiative with Alma College physics department for involvement with airborne lidar experiments and data analysis, 2000-2007
- 37) Received GSFC's James J. Kerley award for Technology Commercialization and Technology Transfer, 2000
- 38) **Principal Investigator** funded by GSFC-DDF to develop holographic circle-to-point converter, 2000-2001
- 39) **Co-Principal Investigator** funded to develop \$1.5M ER-2 Cloud Physics Lidar (CPL) instrument, 1999-2002
- 40) SBIR Topic Manager, Instruments for Earth Science, 2003-2007
- 41) SBIR Subtopic Manager, lidar remote sensing subtopic, 1999-2010
- 42) Participated, by invitation, in European Space Agency VLID Doppler lidar intercomparison field campaign, July 1998
- 43) Vice-Chair, GSFC Gay, Lesbian, Bisexual and Transgender Advisory Committee, 2007-2009

- 44) Member, Source Evaluation Board (SEB) for Code 912 support service contract, 1998
- 45) Mentored Shane Wake/551 for PIP and Science-Engineering Collaborative Program (SECP)
- 46) Supervises employees, contractors, and students

## **FUNDED PROPOSALS**

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- NASA HQ Earth Venture Suborbital, "Investigation of Microphysics and Precipitation for Atlantic Coast-Threatening Snowstorms (IMPACTS)," 2019-2023, \$200K/yr (Co-I).
- NASA HQ (directed), "Algorithm development and data processing for CATS-ISS," 2014-2018, \$700K/yr (PI).
- NASA HQ, "Evaluating the vertical variability of clouds and aerosols over large and small horizontal scales," 2016-2019, \$150K/yr (PI).
- NRL, "Radiative Effects of Thin Cirrus (REThinC)," 2017-2019, \$80K/yr (Co-I).
- NASA HQ Earth Venture Suborbital, "ACT-America," 2015-2019, \$230K/yr (Co-I).
- NOAA, "CPL validation for GOES-R," 2017, \$140K (Co-I).
- NASA ISS Program (directed), "Cloud-Aerosol Transport System for International Space Station (CATS-ISS)," 2011-2014, \$15M (PI).
- NASA HQ, "Integration of Cloud-Aerosol Transport System (CATS) to high-altitude research aircraft," 2011-2012, \$380K/year (PI).
- NASA HQ, "Assessing CALIPSO retrieval uncertainties and examining cirrus cloud properties," 2010-2012, \$200K/yr (PI).
- NASA HQ Earth Venture Suborbital, "Hurricane and Severe Storms Sentinel (HS3)," 2010-2015, \$350K/yr (Co-I).
- NASA-HQ Earth Venture Suborbital, "Airborne Tropical Tropopause Experiment (ATTREX)," 2010-2015, \$350K/yr (Co-I).
- GSFC IR&D, "Assembly and integration for Cloud-Aerosol Transport lidar," 2010, \$70K (PI).
- NASA ESTO, "Detector development for cloud-aerosol transport lidar," 2009-2011, \$300K/yr (PI).
- GSFC IR&D, "Receiver subsystem development for cloud-aerosol transport lidar," 2009, \$360K (PI).
- NASA HQ, "Using satellite-based lidar measurements to simulate Doppler lidar performance and improve simulation models," 2008-2010, \$135K/yr (PI).
- NASA Code YS, "Applications of MIDAS architecture to A-Train measurements: the GSFC component of a joint GSFC-LaRC science investigation," 2008-2010, \$250k/yr (PI).

- NASA HQ, "Lidar measurements from a UAV platform in support of International Polar Year activities," 2008-2010, \$300K/yr (PI).
- GSFC IR&D: "Observation simulation for design of the Global Winds Explorer," 2008, \$150K (PI).
- NASA Code YS, "Cloud Physics Lidar measurements in support of TC4," 2007, \$78K (PI).
- DoE-ARM, "CPL participation in DoE-CLASIC field campaign," 2007, \$180K (PI).
- GSFC IR&D, "UAV-based lidar sensor for next-generation suborbital platforms," 2006, \$135K (PI).
- GSFC IR&D (joint GSFC-LaC award), "UAV-based lidar sensor for next-generation suborbital platforms," 2006, \$92K (PI).
- NASA LaRC, "CPL participation in CALIPSO-CloudSat validation," 2006, \$50K (PI).
- NASA Code YS, "Cloud Physics Lidar measurements in support of Aura and A-Train," 2005-2007, \$150K/yr (PI).
- NASA Code YS, "Combined active and passive measurements for improved understanding of aerosol and cloud characteristics," 2004-2006, \$400k/yr (Co-PI).
- GSFC IR&D, "UAV-based lidar sensor for next-generation suborbital platforms," 2005, \$219K (PI).
- GSFC IR&D, "UAV-based lidar sensor for next-generation suborbital platforms," 2004, \$186K (PI).
- NASA EOS, "CPL participation in THORPEX-PT field campaign," 2003, \$37K (PI).
- NPOESS-IPO, "CPL measurements for THORPEX-AT field campaign," 2003, \$41K (PI).
- NASA Code YS, "Ground-based and airborne lidar observations of cirrus clouds and aerosols during CRYSTAL-FACE," 2002-2003, \$175K (PI).
- NASA EOS, "CPL participation in TX-2002 field campaign," 2002, \$23K (PI).
- GSFC DDF, "Development of prototype holographic Fabry-Perot etalons for daytime lidar measurements," 2001-2002, \$75K (PI).
- GSFC CTD, "Demonstration of atmospheric wind measurements using holographic detection technology," 2001-2002, \$33K (PI).
- NASA Code YS, "THOR lidar," 2001, \$150K (co-PI).
- NOAA-ETL, "Modeling of spacebased direct-detection Doppler wind lidar performance: evaluation of cloud effects," 2001, \$44K (PI).
- NASA Code YS, "Cloud and aerosol radiation experiments with advanced ER-2 lidar observations," 2000-2002, \$769K (PI).
- GSFC DDF, "Space-qualified tunable narrowband filters for lidar applications," 1999-2000, \$75K.

**REFEREED PUBLICATIONS**

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1. **McGill, M.J.**, P.A. Selmer, A.W. Kupchock and J.E. Yorks, 2023: "Machine learning-enabled real-time detection of cloud and aerosol layers using airborne lidar," *Frontiers in Remote Sensing*, 4, doi: 10.3389/frsen.2023.1116817
2. Yorks, J.E., J. Wang, **M.J. McGill**, M. Follette-Cook, E.P. Nowottnick, J.S. Reid, et al. 2023: "A smallsat concept to resolve diurnal and vertical variations of aerosols, clouds, and boundary layer height," *Bulletin of the American Meteorological Society*, doi: 10.1175/BAMS-D-21-0179.1
3. Nowottnick, E.P., K.E. Christian, J.E. Yorks, **M.J. McGill**, N. Midzak, P.A. Selmer, Z. Lu, J. Wang, and S.V. Salinas 2022: "Aerosol detection from the Cloud-Aerosol Transport System on the International Space Station: algorithm overview and implications for diurnal sampling," *Atmosphere*, 13(1439), doi: 10.3390/atmos13091439
4. Chen, X., J. Wang, X. Xu, M. Zhou, H. Zhang, L. Castro-Garcia, P.R. Colarco, S.J. Janz, J. Yorks, **M. McGill**, J.S. Reid, M. de Graaf, and S. Kondragunta, 2021: "First retrieval of absorbing aerosol height over dark target using TROPOMU Oxygen B band: algorithm development and application for surface particulate matter estimates," *Remote Sensing of Environment*, 265, doi: 10.1016/j.rse.2021.112674
5. Yorks, J.E., P.A. Selmer, A. Kupchock, E.P. Nowottnick, K.E. Christian, D. Rusinek, N. Dacic, and **M.J. McGill**, 2021: "Aerosol and cloud detection using machine learning algorithms and space-based lidar data," *Atmosphere*, 12, doi: 10.3390/atmos12050606
6. Zhou, D.K., A.M. Larar, X. Liu, A.M. Noe, G.S. Diskin, A.J. Soja, T. Arnold, and **M.J. McGill**, 2021: "Wildfire-induced CO plume observations from NAST-I during FIREX-AQ field campaign," *IEEE J Sel Topics Appl Earth Observ Remote Sens*, 14, 2901-2910, doi: 10.1109/JSTARS.2021.3059855
7. O'Sullivan, D., F. Marengo, C.L. Ryder, Y. Pradhan, Z. Kipling, B. Johnson, A. Benedetti, M. Brooks, **M. McGill**, J. Yorks, and P. Selmer, 2020: "Models transport Saharan dust too low in the atmosphere: a comparison of the MetUM and CAMS forecasts with observations," *Atmospheric Chemistry and Physics*, 20, 12955-12982, doi: 10.5194/acp-20-12955-2020
8. Knobelspiesse, K., et al., 2020: "The Aerosol Characterization from Polarimeter and Lidar (ACEPOL) airborne field campaign," **Earth System Science Data**, 12, 2183-2208, doi: 10.5194/essd-12-2183-2020
9. Dolinar, E.K., J.R. Campbell, S. Lolli, S.C. Ozog, J.E. Yorks, C. Camacho, Y. Gu, A. Bucholtz, and **M.J. McGill**, 2020: "Sensitivities in satellite lidar-derived estimates of daytime top-of-the-atmosphere optically thin cirrus cloud radiative forcing: a case study," **Geophysical Research Letters**, 47, doi: 10.1029/2020GL088871

10. **McGill, M.J.**, R.J. Swap, J.E. Yorks, P.A. Selmer, and S.J. Piketh, 2020: "Observation and quantification of aerosol outflow from southern Africa using spaceborne lidar," *South African Journal of Science*, 116, doi: 10.17159/sajs.2020/6398
11. Pauly, R., J.E. Yorks, D.L. Hlavka, **M.J. McGill**, V. Amiridis, S.P. Palm, S.D. Rodier, M.A. Vaughan, P. Selmer, A.W. Kupchock, H. Baars, A. Gialitaki, 2019: "CATS 1064 nm Calibration and Validation," *Atmospheric Measurement Techniques*, 12, 6241–6258, doi: 10.5194/amt-12-6241-2019
12. Christian, K., J. Wang, C. Ge, D. Peterson, E.J. Hyer, J. Yorks, and **M. McGill**, 2019: "Radiative forcing and stratospheric warming of pyrocumulonimbus smoke aerosols: first modeling results with multi-sensor (EPIC, CALIPSO, CATS) views from space," *Geophysical Research Letters*, 46, 10061-10071, doi: 10.1029/2019GL082360
13. Nowottnick, E.P., P.R. Colarco, S.A. Braun, D.O. Barahona, A. da Silva, D.L. Hlavka, **M.J. McGill** and J.R. Spackman, 2018: "Dust impacts on the 2012 Hurricane Nadine track during the NASA HS3 field campaign," *Journal of the Atmospheric Sciences*, 2473-2489 doi: 10.1175/JAS-D-17-0237.1
14. Sinclair, K., B. van Diedenhoven, B. Cairns, J. Yorks, A. Wasilewski, and **M. McGill**, 2017: "Remote sensing of multiple cloud layer heights using multi-angular measurements," *Atmospheric Measurement Techniques*, 10, 2361-2375 doi: 10.5194/amt-10-2361-2017
15. Jensen, E., et al., 2017: "The NASA Airborne Tropical Tropopause Experiment high-altitude aircraft measurements in the tropical western Pacific," *Bulletin of the American Meteorological Society*, 98, doi: 10.1175/BAMS-D-14-00263.1
16. Alexandrov, M.D., B. Cairns, B. van Diedenhoven, A.S. Ackerman, A.P. Wasilewski, **McGill, M.J.**, J.E. Yorks, D.L. Hlavka, S.E. Platnick, and G.T. Arnold, 2016: "Polarized view of supercooled liquid water clouds," *Remote Sensing of Environment*, 181, 96-100, doi: 10.1016/j.rse.2016.04.002
17. Yorks, J.E., **McGill, M.J.**, S.P. Palm, D.L. Hlavka, P.A. Selmer, E.P. Nowottnick, M.A. Vaughan, S.D. Rodier, and W.D Hart, 2016: "An overview of the CATS Level 1 processing algorithms and data products," *Geophysical Research Letters*, 43, 4632-4639, doi: 10.1002/2016GL068006
18. Hughes, E.J., J. Yorks, N.A. Krotkov, A.M. da Silva, and **M. McGill**, 2016: "Using CATS near-realtime lidar observations to monitor and constrain volcanic sulfur dioxide (SO<sub>2</sub>) forecasts," *Geophysical Research Letters*, 43, 11089-11097, 10.1002/2016GL070119
19. **McGill, M.J.**, Yorks, J.E., Scott, V.S., Kupchock, A.W., and Selmer, P.A. (2015). The Cloud-Aerosol Transport System (CATS): A technology demonstration on the International Space

Station. Proceedings of the SPIE 9612, Lidar Remote Sensing for Environmental Monitoring XV, 96120A. <https://doi.org/10.1117/12.2190841>

20. Alexandrov, M.D., B. Cairns, A.P. Wasilewski, A.S. Ackerman, **McGill, M.J.**, J.E. Yorks, D.L. Hlavka, S.E. Platnick, and G.T. Arnold, B. van Dierenhoven, J. Chowdhary, M. Ottaviani, and K.D. Knobelspiesse, 2015: "Liquid water cloud properties during the Polarimeter Definition Experiment (PODEX)," *Remote Sensing of Environment*, 169, 20-36, doi: 10.1016/j.rse.2015.07.029
21. Yorks, J.E., **M.J. McGill**, V.S. Scott, S.W. Wake, A. Kupchock, D.L. Hlavka, W.D. Hart, and P.A. Selmer, 2014: "The Airborne Cloud-Aerosol Transport System: Overview and description of the instrument and retrieval algorithms," *Journal of Atmospheric and Oceanic Technology*, 31, 2482-2497, doi: 10.1175/JTECH-D-14-00044.1
22. Jenson, E.J., G. Diskin, R.P. Lawson, S. Lance, T.P. Bui, D. Hlavka, **M. McGill**, L. Pfister, and O.B. Toon, 2013: "Ice nucleation and dehydration in the Tropical Tropopause Layer," *Proceedings of the National Academy of Sciences*, 6(110), 2041-2046
23. Hlavka, D.L., Yorks, J.E., Young, S.A., Vaughan, M.A., Kuehn, R.E., **McGill, M.J.** and Rodier, S.D., 2012: "Airborne validation of cirrus cloud properties derived from CALIPSO lidar measurements: Optical properties," *Journal of Geophysical Research*, 117(D9), doi:10.1029/2011JD017053.
24. **McGill, M.J.**, T. Markus, V.S. Scott, and T. Neumann, 2013: "The Multiple Altimeter Beam Experimental Lidar (MABEL), an airborne simulator for the ICESat-2 mission," *Journal of Atmospheric and Oceanic Technology*, 30, 345-352 <https://doi.org/10.1175/JTECH-D-12-00076.1>
25. Yorks, J.E., D.L. Hlavka, W.D. Hart, and **McGill, M.J.**, 2011: "Statistics of cloud optical properties from airborne lidar measurements," *Journal of Atmospheric and Oceanic Technology*, 28, 869-883, doi:10.1175/2011JTECHA1507.1
26. Nowottnick, E., P. Colarco, A. DaSilva, D. Hlavka and **M. McGill**, 2011: "The fate of Saharan dust across the Atlantic and implications for a Central American dust barrier," *Atmospheric Chemistry and Physics*, doi: 10.5194/acp-11-8415-2011
27. Yorks, J.E., D.L. Hlavka, M.A. Vaughan, **M.J. McGill**, W.D. Hart, S. Rodier, and R. Kuehn, 2011: "Airborne validation of cirrus cloud properties derived from CALIPSO lidar measurements, part 1: spatial properties," *Journal of Geophysical Research*, 116, D19207, doi:10.1029/2011JD015942
28. Vaughan, M.A., Z. Liu, **M.J. McGill**, and M.D. Obland, 2010: "On the spectral dependence of backscatter from cirrus clouds: an assessment of CALIOP's 1064 nm calibration using Cloud Physics Lidar measurements," *Journal of Geophysical Research*, 115, D14206, 2009JD013086

29. Avery, M., C. Twohy, D. McCabe, J. Joiner, K. Severance, E. Atlas, D. Blake, P. Bui, J. Crouse, J. Dibb, G. Diskin, P. Lawons, **M. McGill**, D. Rogers, G. Sachse, E. Scheuer, A.M. Thompson, C. Trepte, P. Wennberg, and J. Ziemke, 2010: "Convective distribution of tropospheric ozone and tracers in the Central American ITCZ region: Evidence from observations during TC4," *Journal of Geophysical Research*, doi: 10.1029/2009JD013450
30. Bucholtz, A., D.L. Hlavka, **M.J. McGill**, K.S. Schmidt, P. Pilewskie, S.M. Davis, E.A. Reid, and A.L. Walker, 2010: "Directly measured heating rates of a tropical subvisible cirrus cloud," *Journal of Geophysical Research*, 115, D00J09, doi: 10.1029/2009JD013128
31. Chang, F.-L., P. Minnis, J.K. Ayers, **M.J. McGill**, R. Palikonda, D.A. Spangenberg, W.L. Smith, Jr., and C.R. Yost, 2010: "Evaluation of satellite-based upper-troposphere cloud-top height retrievals in multilayer cloud conditions during TC4," *Journal of Geophysical Research*, 115, D00J05, doi: 10.1029/2009JD013305
32. Yost, C.R., P. Minnis, J.K. Ayers, D. Spangenberg, A.J. Heymsfield, A. Bansemer, **M.J. McGill**, and D.L. Hlavka, 2010: "Comparison of GOES-retrieved and in-situ measurements of deep convective anvil cloud microphysical properties during the Tropical Composition, Cloud and Climate Coupling Experiment (TC4)," *Journal of Geophysical Research*, 115, D00J06, doi: 10.1029/2009JD013313
33. Jensen, E.J., P. Lawson, B. Baker, B. Pilson, Q. Mo, A.J. Heymsfield, A. Bansemer, T.P. Bui, **M. McGill**, D. Hlavka, G. Heymsfield, S. Platnick, G.T. Arnold, and S. Tanelli, 2009: "On the importance of small ice crystals in tropical anvil cirrus," *Atmospheric Chemistry and Physics*, 9(15), 5519-5537
34. Vaughan, M.A., K.A. Powell, R.E. Keuhn, S.A. Young, D.M. Winker, C.A. Hostetler, W.H. Hunt, Z. Liu, **M.J. McGill**, and B.J. Getzewich, 2009: "Fully automated detection of cloud and aerosol layers using the CALIPSO lidar measurements," *Journal of Atmospheric and Oceanic Technology*, 26(10), 2034-2050, doi: 10.1175/2009JTECHA1228.1
35. Yorks, J.E., **M. McGill**, S. Rodier, M. Vaughan, Y. Hu, and D. Hlavka, 2009: "Radiative effects of African dust and smoke observed from Clouds and the Earth's Radiant Energy System (CERES) and Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) data," *Journal of Geophysical Research*, 114, doi: 10.1029/2009JD01200
36. Ackerman, S.A., R.E. Holz, R. Frey, E.W. Eloranta, B. Maddux, and **M. McGill**, 2008: "Cloud detection with MODIS: part II validation," *Journal of Atmospheric and Oceanic Technology*, 25, 1073-1086
37. Chiriaco, M., H. Chepfer, P. Minnis, M. Haeffelin, S. Platnick, D. Baumgardner, P. Dubuisson, **M. McGill**, V. Noel, J. Pelon, D. Spangenberg, S. Sun-Mack, and G. Wind, 2007: "Comparison

of CALIPSO-like, LaRC and MODIS retrievals of ice cloud properties over SIRTa in France and Florida during CRYSTAL-FACE,” *Journal of Applied Meteorology*, 46, 249-272

38. Heymsfield, A.J., C. Schmitt, A. Bansemer, G.-J. van Zadelhoff, **M.J. McGill**, C. Tohy, and D. Baumgardner, 2007: “Responses to ‘Comments on effective radius of ice cloud particle populations derived from aircraft probes, by Heymsfield et al. (2006)’,” *Journal of Atmospheric and Oceanic Technology*, 24, 1511-1518
39. **McGill, M.J.**, M.A. Vaughan, C.R. Trepte, W.D. Hart, D.L. Hlavka, D.M. Winker, and R. Keuhn, 2007: “Airborne validation of spatial properties measured by the CALIPSO lidar,” *Journal of Geophysical Research*, 112, D20201, doi:10.1029/2007JD008768
40. Noel, V., D.M. Winker, T.J. Garrett, and **M. McGill**, 2007: “Extinction coefficients retrieved in deep tropical ice clouds from lidar observations using a CALIPSO-like algorithm compared to in-situ measurements from the cloud integrating nephelometer during CRYSTAL-FACE,” *Atmospheric Chemistry and Physics*, 7, 1415-1422
41. van Zadelhoff, G.-J., A.J. Heymsfield, D.P. Donovan, and **M.J. McGill**, 2007: “Evaluating lidar-radar microphysics retrieval using in-situ measurements,” *Journal of Geophysical Research*, 112, doi: 10.1029/2006JD007202
42. Winker, D., B. Hunt, and **M. McGill**, 2007: “Initial performance assessment of CALIOP,” *Geophysical Research Letters*, 34, doi: 10.1029/2007GL030135
43. Heymsfield, A.J., C. Schmitt, A. Bansemer, G.-J. van Zadelhoff, **M.J. McGill**, C. Twohy and D. Baumgardner, 2006: “Effective radius of ice cloud particle populations derived from aircraft probes,” *Journal of Atmospheric and Oceanic Technology*, 23, 361-380
44. Holz, R.E., S. Ackerman, P. Antonelli, F. Nagle, **M. McGill**, D.L. Hlavka, and W.D. Hart, 2006: “An improvement to the high spectral resolution CO<sub>2</sub> slicing cloud top altitude retrieval,” *Journal of Atmospheric and Oceanic Technology*, 23, 653-670
45. Hu, Y., Z. Liu, D. Winker, M. Vaughan, V. Noel, L. Bissonnette, G. Roy, and **M. McGill**, 2006: “A simple relation between lidar multiple scattering and depolarization for water clouds,” *Optics Letters*, 31, 1809-1811
46. Liu, Z., W. Hunt, C. Hostetler, M. Vaughan, **M. McGill**, D. Winker, and Y. Hu, 2006: “Estimating random errors in backscatter lidar observations,” *Applied Optics*, 45, 4437-4447
47. Veselovskii, I., M. Korenskii, V. Grianznov, D. Whiteman, **M. McGill**, G. Roy, and L. Bissonnette, 2006: “Information content of data measured with multiple field of view lidar,” *Applied Optics*, 45, 6839-6848

48. Cahalan, R.F., **M.J. McGill**, J. Kolasinski, T. Varnai, and K. Yetzer, 2005: "THOR – Cloud Thickness from Offbeam Lidar Returns," *Journal of Atmospheric and Oceanic Technology*, 22, 605-627
49. Chepfer, H., V. Noel, P. Minnis, D. Baumgardner, L. Nguyen, G. Raga, **M.J. McGill**, and P. Yang, 2005: "Particle habit in tropical ice clouds during CRYSTAL-FACE: Comparison of two remote sensing techniques with in situ observations," *Journal of Geophysical Research*, 110, doi: 10.1029/2004JD005455
50. Hlavka, D.L., S.P. Palm, W.D. Hart, J.D. Spinhirne, **M.J. McGill**, and E.J. Welton, 2005: "Aerosol and cloud optical depth from GLAS: results and verification for an October 2003 California fire smoke case," *Geophysical Research Letters*, 32, doi: 10.1029/2005GL023413
51. Jensen, E., L. Pfister, T. Bui, A. Weinheimer, E. Weinstock, J. Smith, D. Baumgardner, and **M.J. McGill**, 2005: "Formation of a tropopause cirrus layer observed over Florida during CRYSTAL-FACE," *Journal of Geophysical Research*, 110, doi: 10.1029/2004JD004671
52. Mitrescu, C., J.M. Haynes, G.L. Stephens, G.M. Heymsfield, and **M.J. McGill**, 2005: "Cirrus cloud optical, microphysical and radiative properties observed during CRYSTAL-FACE experiment: A radar-lidar retrieval system," *Journal of Geophysical Research*, 110, doi: 10.1029/2004JD005605
53. Zhou, D.K., W.L. Smith, Sr., X. Liu, A.M. Larar, H.-L.A. Huang, J. Li, **M.J. McGill**, and S.A. Mango, 2005: "Thermodynamic and cloud parameter retrieval using infrared spectra data," *Geophysical Research Letters*, 32, doi: 10.1029/2005GL023211
54. Garrett, T.J., A.J. Heymsfield, **M.J. McGill**, B.A. Ridley, D.G. Baumgardner, P.T. Bui, C.R. Webster, 2004: "Convective generation of cirrus near the tropopause," *Journal of Geophysical Research*, 109, doi: 10.1029/2004JD004952
55. Liu, Z., **M. McGill**, Y. Hu, C.A. Hostetler, M. Vaughan, and D. Winker, 2004: "Validating lidar depolarization calibration using solar radiation scattered by ice clouds," *Geoscience Remote Sensing Letters*, 1, doi: 10.1109/LGRS.2004.829613
56. Liu, Z., M.A. Vaughan, D.M. Winker, C.A. Hostetler, L.R. Poole, D. Hlavka, W. Hart, and **M. McGill**, 2004: "Use of probability distribution functions for discriminating between cloud and aerosol in lidar backscatter data," *Journal of Geophysical Research*, 109, doi: 10.1029/2004JD004732
57. **McGill, M.J.**, L. Li, W.D. Hart, G.M. Heymsfield, D.L. Hlavka, P.E. Racette, L. Tian, M.A. Vaughan, and D.M. Winker, 2004: "Combined lidar-radar remote sensing: initial results from CRYSTAL-FACE," *Journal of Geophysical Research*, 109, doi: 10.1029/2003JD004030

58. Noel, V., D.M. Winker, **M. McGill**, and P. Lawson, 2004: "Classification of particle shapes from lidar depolarization ratios in convective ice clouds compared to in situ observations during CRYSTAL-FACE," *Journal of Geophysical Research*, 109, doi: 10.1029/2004JD004883
59. Ridley, B., L. Ott, K. Pickering, L. Emmons, D. Montzka, A. Weinheimer, D. Knapp, F. Grahek, L. Li, G. Heymsfield, **M. McGill**, P. Kucera, M.J. Mahoney, D. Baumgardner, M. Schultz and G. Brasseur, 2004: "Florida thunderstorms: a faucet of reactive nitrogen to the upper troposphere," *Journal of Geophysical Research*, 109, doi: 10.1029/2004JD004769
60. Sherwood, S.C., J-H. Chae, P. Minnis and **M. McGill**, 2004: "Underestimation of deep convective cloud tops by thermal imagery," *Geophysical Research Letters*, 31, doi: 10.1029/2004GL019699
61. Sherwood, S.C., P. Minnis, and **M. McGill**, 2004: "Deep convective cloud top heights and their thermodynamic control during CRYSTAL-FACE," *Journal of Geophysical Research*, 109, doi: 10.1029/2004JD004811
62. **McGill, M.J.**, 2003: "Lidar Remote Sensing," in *Encyclopedia of Optical Engineering*, pp. 1103-1113, doi: 10.1081/E-EOE 120009862
63. **McGill, M.J.**, D.L. Hlavka, W.D. Hart, E.J. Welton, and J.R. Campbell, 2003: "Airborne lidar measurements of aerosol optical properties during SAFARI-2000," *Journal of Geophysical Research*, 108, doi: 10.1029/2002JD002370
64. Schmid, B., J. Redemann, P.B. Russell, P.V. Hobbs, D.L. Hlavka, **M. McGill**, W. Hart, B.N. Holben, E.J. Welton, J. Campbell, O. Torres, R. Kahn, D. Diner, M. Helmlinger, D.A. Chu, C. Robles-Gonzalez, and D. de Leeuw, 2003: "Coordinated airborne, spaceborne, and ground-based measurements of massive, thick aerosol layers during the dry season in Southern Africa," *Journal of Geophysical Research*, 108, doi: 10.1029/2002JD002297
65. Davis, A.B., S.P. Love, R.F. Cahalan, and **M.J. McGill**, 2002: "Off-beam lidar senses cloud thickness and density," *Laser Focus World*, 38, 101-104
66. **McGill, M.J.**, D.L. Hlavka, W.D. Hart, V.S. Scott, J.D. Spinhirne, and B. Schmid, 2002: "Cloud Physics Lidar: instrument description and initial measurement results," *Applied Optics*, 41, 3725-3734, <https://doi.org/10.1364/AO.41.003725>
67. **McGill, M.J.**, and R.D. Rallison, 2001: "Holographic optics convert rings to points for detection," *Laser Focus World*, 37, 131-136
68. Davis, A.B., R.F. Cahalan, J.D. Spinhirne, **M.J. McGill** and S.P. Love, 1999: "Off-beam lidar: An emerging technique in cloud remote sensing based on radiative Green-function theory in the diffusion domain," *Physics and Chemistry of the Earth - B*, 24, 177-185

69. **McGill, M.J.**, W.D. Hart, J.A. McKay, and J.D. Spinhirne, 1999: "Modeling the performance of direct-detection Doppler lidar systems including cloud and solar background variability," *Applied Optics*, 38, 6388-6397
70. **McGill, M.J.** and J.D. Spinhirne, 1998: "A comparison of two direct-detection Doppler lidar techniques", *Optical Engineering*, 37, 2675-2686
71. **McGill, M.J.**, M. Marzouk, V.S. Scott, and J.D. Spinhirne, 1997: "Holographic circle-to-point converter with particular applications for lidar work," *Optical Engineering*, 36, 2171-2175
72. **McGill, M.J.** and W.R. Skinner, 1997: "Use of multiple Fabry-Perot interferometers in an incoherent Doppler lidar," *Optical Engineering*, 36, 139-145
73. **McGill, M.J.**, W.R. Skinner, and T.D. Irgang, 1997: "Validation of wind profiles measured using incoherent Doppler lidar," *Applied Optics*, 36, 1928-1939
74. **McGill, M.J.**, W.R. Skinner, and T.D. Irgang, 1997: "Analysis techniques for the recovery of winds and aerosol backscatter coefficients from a multiple channel incoherent Doppler lidar," *Applied Optics*, 36, 1253-1268
75. Fischer, K.W., V.J. Abreu, W.R. Skinner, J.E. Barnes, **M.J. McGill**, and T.D. Irgang, 1995: "Visible wavelength Doppler lidar for measurement of wind and aerosol profiles during day and night," *Optical Engineering*, 34, 499-511

#### INVITED PRESENTATIONS

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1. **McGill, M.J.**, "One lidar scientist's career pathway and vision for the future," invited presentation at the *AMS Annual Meeting* (Boston, MA, January 12-16, 2020)
2. **McGill, M.J.**, and J.E. Yorks, "The Cloud-Aerosol Transport System (CATS): Atmospheric remote sensing from the ISS," invited presentation at the *DLR Conference on Climate Change* (Cologne, Germany, April 5-7, 2016)
3. **McGill, M.J.** and T. Markus, "ICESat-2 and the importance of space-based laser altimetry measurements," invited tutorial presentation at the *Conference on Lasers and Electro Optics (CLEO)*; Baltimore, MD, May 1-6, 2011)
4. **McGill, M.J.**, J.E. Yorks, D.L. Hlavka, and M.A. Vaughan, "Airborne validation of CALIPSO data products," in *Proceedings of the American Geophysical Union joint assembly* (Toronto, Canada, May 24-27, 2009)
5. **McGill, M.J.**, V.S. Scott, and M.J. Sirota, "Development of an autonomous lidar instrument for use on a UAV platform (*invited*)," in *Proceedings of the Infotech@Aerospace conference* (Arlington, VA, September 26-29, 2005)