Bryan A. Baum
Curriculum Vitae

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Work Address: Science and Technology Corporation
Madison, WI 53705

Education:

B.S., 1978, Chemical Engineering, Vanderbilt University, Nashville, Tennessee
M.S., 1985, Chemical Engineering, University of Colorado at Boulder, Boulder, Colorado
Ph.D., 1989, Atmospheric Sciences, Georgia Institute of Technology, Atlanta, Georgia

Present Research Interests:

- Retrieval of single- and multi-layered cloud properties from multispectral satellite data
- Development of ice cloud bulk scattering models for remote sensing applications
- Evaluation of remotely-sensed cloud properties using active sensor measurements
- Discrimination of smoke, fires, snow, sea ice, heavy aerosols, and clouds in satellite imagery

Work Experience:

Senior Research Scientist, 04/2018–Present, Science and Technology Corp., Madison, WI 53705
Senior Scientist, 10/2010–03/2018 (Retired), Space Science and Engineering Center, University of Wisconsin-Madison, Madison, WI 53706
Associate Scientist, 07/2006 – 09/2010, Space Science and Engineering Center, University of Wisconsin-Madison, Madison, WI 53706
Senior Research Scientist, 10/2004-07/2006, Climate Science Branch, Science Mission Directorate, NASA Langley Research Center, Hampton, Virginia
Senior Research Scientist, 08/1995-10/2004, Radiation and Aerosols Branch, Atmospheric Sciences Division, NASA Langley Research Center, Hampton, Virginia
Research Scientist, 11/1989-08/1995, Radiation Sciences Branch, Atmospheric Sciences Division, NASA Langley Research Center, Hampton, Virginia
Scientist, 10/1989-11/1989, Lockheed Engineering and Sciences Company, Hampton, VA 23666 (Supporting the Radiation Sciences Branch, NASA Langley)
Scientist, 07/1989-10/1989, Planning Research Corporation, Hampton, VA 23666 (Supporting the Radiation Sciences Branch, NASA Langley)
Graduate Research Assistant, 1985-1989, Georgia Institute of Technology, Atlanta, Georgia
Graduate Research Assistant, 1984-1985, National Center for Atmospheric Research, Boulder, Colorado
Chemical Engineer, 1980-1983, Engineering Propulsion Laboratory, Martin Marietta Aerospace, Denver, Colorado

Academic Experience:

Adjunct Lecturer, 1996-1997 academic year, Applied Science Department, The College of William and Mary, Williamsburg, Virginia.

Fall semester, 1996: Taught graduate course entitled ***Cloud Physics***.

Adjunct Professor, 1997-1998 academic year, Applied Science Department, The College of William and Mary, Williamsburg, Virginia.

Fall semester, 1997: Taught graduate course entitled ***Cloud Physics***
Spring semester, 1998: Taught graduate course entitled ***Interpretation of Clouds in Satellite Imagery***.

Adjunct Associate Professor, 1999 - 2002, Atmospheric and Oceanic Science Department, University of Wisconsin-Madison, Madison, Wisconsin. Student evaluations: 4.5

Spring semester, 2001: Taught graduate course (AOS 801) entitled ***Remote Sensing of Aerosol and Cloud Properties from Satellite Data.***

Committees and Appointments:

Co-chair, (2014-present): International Clouds Working Group (ICWG), under the umbrella of Coordination Group for Meteorological Satellites (CGMS). The ICWG-CGMS provides an international forum for the exchange of technical information on cloud property retrievals from geostationary and polar orbiting meteorological satellite systems.

Co-chair, CREW (2011-2014): Cloud Retrieval Evaluation Workshop, an effort initiated in 2005 to bring together cloud remote sensing experts from European and American organizations to compare regional/global cloud products, assess state-of-the-art in cloud products and their validation, and discuss mitigation strategies for recognized problem areas. It took us a while to become organized to the point of having leadership positions.

Program co-chair, Hyperspectral Imaging and Sounding of the Environment (HISE) conference, sponsored by the Optical Society of America (OSA), Toronto, Canada, 10-14 July, 2011.

Editor, Journal of Applied Meteorology and Climatology (published by the American Meteorological Society, or AMS), 2007-2012 (6 years total)

Program co-chair, Hyperspectral Imaging and Sounding of the Environment (HISE) conference, sponsored by the Optical Society of America (OSA), Vancouver, British Columbia, April 27-30, 2009.

Program co-chair, Hyperspectral Imaging and Sounding of the Environment (HISE) conference, sponsored by the Optical Society of America (OSA), Santa Fe, NM, February 12-15, 2007.

Co-chair, Panel to assess and evaluate the strengths and weaknesses of the existing long-term cloud climatologies, under the auspices of the GEWEX Radiation Panel. 2004-2008.

Member, HISE Program Committee, Optical Society of America. For conference held January 31-February 3, 2005 in Alexandria, Virginia.

Member, American Meteorological Society STAC (Scientific and Technological Activities Commission) Committee on Cloud Physics, 2004-2006

Member, American Meteorological Society STAC Committee on Atmospheric Radiation, January 31, 1998-January 30, 2001

Member, American Meteorological Society STAC Committee on Artificial Intelligence (AI) Applications to Environmental Science, January 31, 2001-January 30, 2004

Professional Organization Affiliations:

Member, American Meteorological Society (AMS)
Member, American Geophysical Union (AGU)

Other Professional Activities

Reviewer of scientific manuscripts for *Reviews of Geophysics; Journal of Climate; Journal of Applied Meteorology; Journal of Applied Meteorology and Climatology; Journal of Atmospheric Science; Journal of Atmospheric and Oceanic Technology; Journal of Geophysical Research (Atmospheres; Oceans); Applied Optics; Geophysical Research Letters; Monthly Weather Review; IEEE Transactions on Geoscience and Remote Sensing; IEEE Geoscience and Remote Sensing Letters; Contributions to Atmospheric Physics; Remote Sensing of Environment; Annals of Glaciology; International Journal of Remote Sensing; Atmospheric Research; Journal of Terrestrial, Atmospheric and Oceanic Sciences; Journal of Agricultural and Forest Meteorology; Atmospheric Chemistry and Physics Journal; Bulletin of the American Meteorological Society; Remote Sensing (open access journal), Quarterly Journal of the Royal Meteorological Society (UK), Journal of Quantitative Spectroscopy and Radiative Transfer, Journal of Atmospheric and Solar-Terrestrial Physics, Meteorology and Atmospheric Physics*, *Computers and Geophysics*, *Atmospheric Measurement Techniques, Progress in Earth and Planetary Science, Scientific Reports (a publication of Nature), and Scientific Online Letters on the Atmosphere (SOLA).*

Reviewer of scientific proposals for NASA, the National Oceanic and Atmospheric Administration (NOAA), the Department of Energy (DOE), the National Science Foundation (NSF), the Natural Environmental Research Council (NERC, United Kingdom), and the Israel Science Foundation (ISF).

Current and Previous Research Investigations:

Principal Investigator and NASA Suomi-NPP Science Team Leader on a proposal titled "*Fusion of VIIRS and CrIS data to construct supplementary infrared band radiances for VIIRS*." Funding provided for years 2018-2021 by the NASA Science Mission Directorate; Earth Science Division. Co-investigator: Dr. Elisabeth Weisz (SSEC, UW-Madison).

Principal Investigator and Atmosphere Discipline Lead (*NASA Suomi-NPP Science Team*) on a proposal titled "*Continuity of Cloud Top Pressure and Cloud Infrared Thermodynamic Phase by Combining CrIS and VIIRS Measurements*." Funding provided for years 2014-2017 by the NASA Science Mission Directorate; Earth Science Division. Co-investigators are Dr. W. Paul Menzel (SSEC, UW-Madison) and Prof. Irina Gladkova (City College of New York).

Principal Investigator (*NOAA, National Environmental Satellite Data and Information Service, Center for SaTellite Applications and Research, or NOAA/NESDIS/STAR*) on a proposal titled "Identification and analysis of severe pyroConvection events using GOES-R ABI and GLM data." Funding provided for FY 2015-2016.

Principal Investigator (*NOAA/NESDIS/STAR*) on a proposal titled "*Identification of Severe PyroConvection Events in GOES-R and Suomi-NPP Data*." One year of funding provided for FY 2014.

Principal Investigator (*NASA NPP Science Team for Climate Data Records*) on a proposal titled "*Evaluation of VIIRS cloud top property climate data records and their potential improvement with CrIS*." Funding is provided for years 2011-2013 by the NASA Science Mission Directorate; Earth Science Division. Co-investigators include Drs. W. Paul Menzel and Elisabeth Weisz (SSEC, UW-Madison).

Principal Investigator (NASA Aqua/Terra Science Team) on a proposal entitled "*Ice Cloud Bulk Scattering and Absorption Models: Refinement through Intercomparison of Hyperspectral, Narrowband, and Polarization Sensors*"." Funding is provided for years 2011-2013 by the NASA Science Mission Directorate; Earth Science Division. Co-investigators include Dr. Ping Yang (Texas A&M University) and Dr. Andrew Heymsfield (National Center for Atmospheric Research, Boulder, CO).

Principal Investigator (NASA GLORY Science Team) on a proposal entitled "Investigation of Ice Particle Characteristics Through Comparison of APS and MODIS Measurements." Funding is provided for years 2011-2013 by the NASA Science Mission Directorate; Earth Science Division. Co-investigators include Dr. Ping Yang (Texas A&M University) and Dr. Steve Platnick (NASA Godard Space Flight Center).

Principal Investigator on a proposal entitled "Refinement of ice cloud bulk optical models: From microphysical measurements to global retrievals using multiple satellite instruments." Funding is provided for 2008-2010 by the NASA Science Mission Directorate, Earth Science Division. Co-investigators include Dr. Ping Yang (Texas A&M University) and Dr. Andrew Heymsfield (National Center for Atmospheric Research, Boulder, CO).

Principal Investigator on a proposal entitled "Assessment of cloud parameters in the NPOESS environmental data records and climate data records." Funding is provided for years 2008-2010 by the NASA Science Mission Directorate, Earth Science Division.

Principal Investigator on an Education/Public Outreach proposal entitled "One Earth, Many Views: A multicultural program for teaching earth science education using remote sensing data." Funding is provided for years 2008-2010 (3 years) by the NASA Science Mission Directorate, Earth Science Division.

Co-Investigator on a proposal entitled "Algorithm maintenance and validation of MODIS cloud mask, cloud top-pressure, cloud phase and atmospheric sounding algorithms. Funding is provided for years 2008-2011 by the NASA Science Mission Directorate, Earth Science Division. Dr. Steve Ackerman is the Principal Investigator.

Co-Investigator on a proposal entitled "Development of a decadal cloud climatology from NOAA polar orbiting (AVHRR and HIRS) through EOS (MODIS and AIRS) to NPOESS (VIIRS and CrIS)." Funding is provided for years 2008-2011 by the NASA Science Mission Directorate, Earth Science Division. Dr. W. Paul Menzel is the Principal Investigator.

Co-Investigator on a proposal entitled "Estimation of cloud microphysics from MODIS Infrared Observations." Funding is provided for years 2008-2011 by the NASA Radiation Sciences Program (Dr. Hal Maring). Dr. Andrew Heidinger, Principal Investigator, NOAA. Co-investigators include Dr. Steve Platnick (NASA Goddard Space Flight Center, Dr. Ping Yang (Texas A&M University), and Michael Pavolonis (NOAA/NESDIS).

Principal Investigator on a proposal entitled " Regional and global analyses of multilayered clouds, ice phase clouds, and mixed phase clouds using EOS-Terra and Aqua data." Funding is provided for years 2004-2006 by the NASA Radiation Sciences Program (Dr. Hal Maring). Co-investigators include Dr. Ping Yang (Texas A&M University), Dr. Andrew Heymsfield, (National Center for Atmospheric Research, Boulder, CO), and Dr. Steve Platnick (NASA Goddard Space Flight Center.

Co-Investigator on a proposal entitled "Maintaining and refining the calibration of infrared radiances and the derivation of cloud properties with MODIS." Funding is provided for years 2004-2006 by the NASA Radiation Sciences Program (Dr. Hal Maring). Dr. W. Paul Menzel, Principal Investigator, NOAA. Co-investigators include Chris Moeller and Richard Frey (Cooperative Institute for Meteorological Satellite Studies, University of Wisconsin-Madison).

Co-Investigator on a proposal entitled "Global Analysis of MODIS Level-3 Cloud Properties and their Sensitivity to Aggregation Strategies." Funding is provided for years 2004-2006 by the NASA Radiation Sciences Program (Dr. Hal Maring). Dr. Steve Platnick, Principal Investigator, NASA Goddard Space Flight Center. Other co-investigators include Dr. Steven Ackerman (University of Wisconsin-Madison), Dr. Michael King (NASA Goddard Space Flight Center), and Dr. Robert Pincus (NOAA-CIRES, Boulder, CO).

Principal Investigator on a proposal entitled "Science support for the National Polar Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) Cloud Retrieval Effort." Funding is provided for three years beginning in 2004 by the NASA NPP Program headed by Dr. James Dodge, NASA HQ. Co-Investigators include Dr. Ping Yang (Texas A&M University), Dr. W. Paul Menzel (NOAA), while Dr. Steve Platnick (NASA GSFC) is a collaborator.

Principal Investigator on a proposal entitled "Analysis of historical cirrus in-situ data in support of Terra, Aqua, and GIFTS cirrus retrieval efforts." Funding is provided for years 2001-2004 by the NASA

Radiation Sciences Program (Dr. Don Anderson). Co-Investigators include Dr. Ping Yang (Texas A&M University), Dr. Andrew Heymsfield (National Center for Atmospheric Research), and Dr. Steve Ackerman (University of Wisconsin-Madison).

Principal Investigator on a proposal entitled "The remote sensing of overlapping cloud properties using MODIS data and ARM CART site data." Funding is provided in years 2000-2002 by the Atmospheric Radiation Measurement (ARM) program, Office of Energy Research, Department of Energy.

Co-Investigator on the NASA aerosol investigation entitled "Characterizing the Clear-Sky Direct Aerosol Radiative Forcing From Surface Solar Observations: A Long-Term Globally Distributed Validation Data Set." The Principal Investigator is Dr. Paul Stackhouse, NASA Langley Research Center.

Principal Investigator on a proposal (F.Y. 1998, 1999) entitled "Development of methods to improve detection and analysis of overlapping cloud layers using MODIS data" funded by NASA Goddard Space Flight Center.

Co-Investigator on the Clouds and the Earth's Radiant Energy System (CERES) team in support of the NASA Mission to Planet Earth Program; 1994-1998.

Co-Investigator on the NASA EOS-AM study entitled "Validation of CERES cloud retrievals over the Arctic with surface-based millimeter-wave radar." The Principal Investigator is Taneil Uttal, Environmental Technology Laboratory, NOAA, Boulder, CO, 1997-2000.

Co-Investigator on a proposal entitled the "AVHRR/HIRS/IASI Global cloud mask and cloud property retrieval." The proposal is for the IASI Mission on the EUMETSAT Polar Orbiting System, 1996-1998.

Principal Investigator on a proposal entitled the "Global study of layered cloud systems and their influence on the top-of-atmosphere radiation budget." The proposal was funded by the NASA Pathfinder data set product generation and development program. 1995-1997.

Principal Investigator on a proposal entitled "Multilevel cloud properties determined from theory and merged HIRS and AVHRR data." Funded by the Clouds and Radiation Program, Office of Space Science and Applications, NASA, 1992-1994.

Co-Investigator on a proposal entitled "Development of remote sensing techniques for determination of contrail properties from satellites," funded by the Mission to Planet Earth and Office of Aeronautics, NASA, 1995-1997.

Project Scientist Roles:

Project Scientist, NASA Langley Research Center Distributed Active Archive Center (DAAC), Fall, 1995-Spring 1996. The Langley DAAC is a part of the Earth Observing System Data and Information System (EOSDIS) being developed in support of the NASA Mission to Planet Earth program.

Deputy Project Scientist, NASA Langley Research Center Distributed Active Archive Center (DAAC), 1991-Fall, 1995. Also served as Chair of the User Working Group, a body designed to provide scientific oversight to the development of the DAAC data holdings.

Awards and Honors:

Invited Speaker, Gordon Research Conference on Radiation and Climate, 2013

NASA Group Achievement Award, 2012
Awarded to the Suomi NPP Mission Development Team

NASA Group Achievement Award, NASA Goddard Space Flight Center, 2003
Awarded to the Earth Observing System (EOS) Aqua Mission Team.

NASA Group Achievement Award, NASA Langley Research Center, 1998
Awarded to the Clouds and the Earth's Radiant Energy Study (CERES) team.

NASA Group Achievement Award, NASA Langley Research Center, 1995
Awarded to the Earth Observing System and Data Information System (EOSDIS) Distributed Active Archive Center (DAAC) Team.

NASA Group Achievement Award, NASA Goddard Space Flight Center, 1995
Awarded to the EOSDIS Version 0 Team.

NASA Outstanding performance rating: 1991, 1992, 1993, 1994, 1995, 1996

NASA Performance Awards: 1997, 2001, 2002, 2003, 2004, 2005

NASA Floyd L. Thompson Fellowship, NASA Langley Research Center, 1998.
Note: This is a prestigious award given to typically 2 or at most 3 people per year. It is intended to provide engineers and scientists with an opportunity to work at a remote institution such as a university or a research laboratory. Essentially, this is equivalent to taking a sabbatical and gives the researcher an opportunity to explore and learn new ideas and methods while unencumbered with the typical day-to-day responsibilities at NASA.
Purpose: Pursue dedicated research at the Space Science Engineering Center, University of Wisconsin at Madison from June–August, 1998.

Peer-Reviewed Publications

Note: Current citation information from the Web of Science is provided at http://www.researcherid.com/rid/B-7670-2011. Other statistics are available at ResearchGate and Google Scholar.

Baum, B. A., W. B. Krantz, J. H. Fink, and R. E. Dickinson, 1989: Taylor instability in rhyolite lava flows. *J. Geophys. Res*., **94**, No. B5, 5815-5828.

Chameides, W. L., D. D. Davis, J. H. Bradshaw, S. Sandholm, M. Rodgers, B. A. Baum, B. Ridley, S. Madronich, M. A. Carroll, G. Gregory, H. I. Schiff, D. R. Hastie, A. Torres, and E. Condon, 1990: Observed and model-calculated NO_2/NO ratios in tropospheric air sampled during the NASA GTE/CITE-2 field study. *J. Geophys. Res*., **95**, No. D7, 10,235-10, 247.

Baum, B. A., B. A. Wielicki, P. Minnis, and L. Parker, 1992: Cloud property retrieval using merged HIRS and AVHRR data. *J. Appl. Meteor*., **31**, No. 4, 351-369.

Baum, B. A. and B. R. Barkstrom, 1993: Design and implementation of a prototype data system for Earth radiation budget, cloud, aerosol, and chemistry data. *Bull. Amer. Meteor. Soc*., **74**, 591-598.

Baum, B. A. and B. A. Wielicki, 1994: Cirrus cloud retrieval using infrared sounding data: Multilevel cloud errors. *J. Appl. Meteor*., **33**, No. 1, 107-117

Baum, B. A., R. F. Arduini, B. A. Wielicki, P. Minnis, S-C. Tsay, 1994: Multilevel cloud retrieval using multispectral HIRS and AVHRR data: Nighttime oceanic analysis. *J. Geophys. Res.*, **99**, 5499-5514.

Baum, B. A., T. Uttal, M. Poellot, T. P. Ackerman, J. M. Alvarez, J. Intrieri, D. O'C. Starr, J. Titlow, V. Tovinkere, and E. Clothiaux, 1995: Satellite remote sensing of multiple cloud layers. *J. Atmos. Sci*., **52**, No. 23, 4210-4230.

Ou, S. C., K. N. Liou, Y. Takano, N. X. Rao, Q. Fu, A. J. Heymsfield, L. M. Miloshevich, B. A. Baum, and S. A. Kinne, 1995: Remote sounding of cirrus cloud optical depths and ice crystal sizes from AVHRR data: Verification using FIRE-II IFO Measurements. *J. Atmos. Sci*., **52**, No. 23, 4143-4158.

Ou, S. C., K.N. Liou, and B. A. Baum, 1996: Detection of multilayer cirrus cloud systems using AVHRR data: Verification based on FIRE-II IFO composite measurements. *J. Appl. Meteor*., **35**, 178-191.

Baum, B. A., V. Tovinkere, J. Titlow, and R. M. Welch, 1997: Automated cloud classification of global AVHRR data using a fuzzy logic approach. *J. Appl. Meteor.*, **36**, 1519-1540.

Wielicki, B. A., B. R. Barkstrom, B. A. Baum, T. P. Charlock, R. N. Green, D. P. Kratz, R. B. Lee, P. Minnis, G. L. Smith, T. Wong, D. F. Young, and the CERES Science Team, 1998: Clouds and the Earth's Radiant Energy System (CERES): Algorithm overview. *IEEE Trans. Geosci. Remote Sensing*, **36**, 1127-1141.

Rinsland, C.P., M. R. Gunson, P. Wang, R. F. Arduini, B. A. Baum, P. Minnis, A. Goldman, M. C. Abrams, R. Zander, E. Mahieu, R. J. Salawitch, H. A. Michelsen, F. W. Irion, and M. J. Newchurch, 1998: ATMOS/ATLAS 3 infrared profile measurements of clouds in the Tropical and subtropical upper troposphere. *J. Quant. Spectrosc. Radiant. Transfer*, **60**, 903-919.

Rinsland, C.P., M. R. Gunson, P. Wang, R. F. Arduini, B. A. Baum, P. Minnis, A. Goldman, M. C. Abrams, R. Zander, E. Mahieu, R. J. Salawitch, H. A. Michelsen, F. W. Irion, and M. J. Newchurch, 1998: ATMOS/ATLAS 3 infrared profile measurements of trace gases in the November 1994 Tropical and subtropical upper troposphere. *J. Quant. Spectrosc. Radiant. Transfer*, **60**, 891-902.

Olson, J. R., B. A. Baum, D. R. Cahoon, and J. Crawford, 1999: The frequency and distribution of forest, savanna, and crop fires over tropical regions during PEM-Tropics A. *J. Geophys. Res*., **104**, 5865-5876.

Berendes, T.A., K. S. Kuo, R. M. Welch, B. A. Baum, A. Pretre, A. M. Logar, E. M. Corwin, and R. C. Weger, 1999: A comparison of paired-histogram, maximum likelihood, and neural network approaches for daylight global cloud classification using AVHRR imagery. *J. Geophys. Res.* **104**, 6199-6213.

Baum, B.A. and Q. Trepte, 1999: A grouped threshold approach for scene identification in AVHRR imagery. *J. Atmos. Ocean. Technol*., **16**, 793-800.

Frey, R. A., B. A. Baum, W. P. Menzel, S. A. Ackerman, C. C. Moeller, and J. D. Spinhirne, 1999: Validation of CO_2-slicing cloud heights computed from MAS radiance data during SUCCESS. *J. Geophys. Res*., **104**, 24,547-24,555.

Baum, B. A., D. P. Kratz, P. Yang, S. Ou, Y. Hu, P. F. Soulen, and S-C. Tsay, 2000a: Remote sensing of cloud properties using MODIS Airborne Simulator imagery during SUCCESS. I. Data and models. *J. Geophys. Res*., **105**, 11,767-11,780.

Baum, B. A., P. F. Soulen, K. I. Strabala, M. D. King, S. A. Ackerman,W. P. Menzel, and P. Yang, 2000b: Remote sensing of cloud properties using MODIS Airborne Simulator imagery during SUCCESS. II. Cloud thermodynamic phase. *J. Geophys. Res*., **105**, 11,781-11,792.

Baum, B. A. and J. D. Spinhirne, 2000: Remote sensing of cloud properties using MODIS Airborne Simulator imagery during SUCCESS. III. Cloud overlap. *J. Geophys. Res*., **105**, 11,793-11,804.

Yang, P., B.-C. Gao, B. A. Baum, W. Wiscombe, Y. Hu, S. Nasiri, A. Heymsfield, G. McFarquhar, and L. Miloshevich, 2001: Sensitivity of cirrus bidirectional reflectance to vertical inhomogeneity of ice crystal habits and size distributions. *J. Geophys. Res.,* **106**, 17267-17291.

Yang, P., B.-C. Gao, B. A. Baum, Y. X. Hu, W. J. Wiscombe, S.-C. Tsay, and D. M. Winker, 2001: Radiative properties of cirrus clouds in the infrared (8-13 μm). *J. Quant. Spectrosc. Radiant. Transfer*, **70**, 473-504.

Yang, P., B.-C. Gao, B. A. Baum, Y. X. Hu, W. Wiscombe, M. I. Mischenko, D. M. Winker, and S. L. Nasiri, 2001: Asymptotic solutions of optical properties of large particles with strong absorption. *Appl. Opt.*, **40**, 1532-1547.

Hu, Y., D. Winker, P. Yang, B. A. Baum, L. Poole, and L. Vann, 2001: Identification of cloud phase from PICASSO-CENA lidar depolarization: A multiple scattering sensitivity study. *J. Quant. Spectrosc. Radiant. Transfer*, **70**, 569-579.

Nasiri, S. L., B. A. Baum, A. J. Heymsfield, P. Yang, M. Poellot, D. P. Kratz, and Y. Hu, 2002: Development of midlatitude cirrus models for MODIS using FIRE-I, FIRE-II, and ARM *in-situ* data. *J. Appl. Meteor.,* **41**, 197-217.

Yang, P., G.-C. Gao, W. J. Wiscombe, M. I. Mishchenko, S. Platnick, H.-L. Huang, B. A. Baum, Y. X. Hu, D. Winker, S.-C. Tsay, and S. K. Park, 2002: Inherent and apparent scattering properties of homogeneous or coated spheres embedded in an absorbing host medium. *Appl. Opt*., **41**, 2740-2759.

Key, J. R., P. Yang, B. A. Baum, and S. L. Nasiri, 2002: Parameterization of shortwave ice cloud optical properties for various particle habits. *J. Geophys. Res*., 107(D13), 10.1029/2001JD000742.

Yang, P. Y. X. Hu, D. M. Winker, J. Zhao, C. A. Hostettler, L. Poole, B. A. Baum, M. I. Mischenko, and J. Reichardt, 2003: Enhanced lidar backscattering by horizontally oriented ice crystal plates in cirrus clouds. **79-80**, 1139-1157.

Yang, P., H.-L. Wei, B. A. Baum, H.-L. Huang, A. J. Heymsfield, Y.-X. Hu, and D. D. Turner, 2003: The spectral signature of mixed-phase clouds composed of nonspherical ice crystals and spherical liquid droplets in the terrestrial window region. *J. Quant. Spectrosc. Radiant. Transfer*, **79-80**, 1171-1188.

Yang, P., B. A. Baum, A. J. Heymsfield, Y.X. Hu, H.-L. Huang, S.-C. Tsay, and S. Ackerman, 2003: Single scattering properties of droxtals. *J. Quant. Spectrosc. Radiant. Transfer*, **79-80**, 1159-1169.

Platnick, S., M. D. King, S. A. Ackerman, W. Paul Menzel, B. A. Baum, and R. A. Frey, 2003: The MODIS cloud products: Algorithms and examples from Terra. *IEEE Trans. Geosci, Remote Sens.* **41**, 459-473.

Baum, B. A., R. A. Frey, G. G. Mace, M. K. Harkey, and P. Yang, 2003: Nighttime multilayered cloud detection using MODIS and ARM data. *J. Appl. Meteor*., 42, 905-919.

Heymsfield, A. J., S. Matrosov, and B. A. Baum, 2003: Ice water path-optical depth relationships for cirrus and deep stratiform ice cloud layers. *J. Appl. Meteor*., **42**, 1369-1390.

Turner, D. D., S. A. Ackerman, B. A. Baum, H. E. Revercomb, and P. Yang, 2003: Cloud phase determination using ground-based AERI observations at SHEBA, *J. Appl. Meteor*., 42, 701-715.

Lee, Y.K., P. Yang, M. I. Mishchenko, B. A. Baum, Y. X. Hu, H.-L. Huang, W. J. Wiscombe, and A. J. Baran, 2003: On the use of circular cylinders as surrogates for hexagonal pristine ice crystals in scattering calculations at infrared wavelengths. *Appl. Opt*., **42**, 2653-2664.

Yang, P., M. G. Mlynczak, H.-L. Wei, D. P. Kratz, B. A. Baum , Y.-X. Hu, M. I. Mishchenko, 2003: Spectral signature of cirrus clouds in the far-infrared region: Single-scattering calculations and radiative sensitivity study. *J. Geophys. Res* ., 108(D18), 4569, doi: 10.1029/2002JD003291.

Guo, G., P. Yang, Y. X. Hu, D. Winker, C. A. Hostetler, B. A. Baum , and J. Reichardt, 2003: Manifestations of interference fluctuations of phase functions and backscattering cross sections for ice crystals with specific orientations. *J. Opt A: Pure Appl. Opt* ., **5**, 520-527.

Yang, P., H. Wei, G. W. Kattawar, Y.-X. Hu, D. M. Winker, C. A. Hostetler, and B. A. Baum, 2003: Sensitivity of backscattering Mueller matrix contours to particle shape and particle thermodynamic phase. *Appl. Opt*., **42**, 4389-4395.

Huang, H.-L, P. Yang, H.-L. Wei, B. A. Baum, Y.-X. Hu, P. Antonelli, S. A. Ackerman, 2004: Retrieval of ice cloud properties from high spectral resolution infrared observations. *IEEE Trans. Geosci, Remote Sens.* **42**, 842-853.

Zhang, Z., P. Yang, G. W. Kattawar, S.-C. Tsay, B. A. Baum, Y. X. Hu, A. J. Heymsfield, and J. Reichardt, 2004: Geometric optics solution for the scattering properties of droxtal ice crystals. *Appl. Opt*., **43**, 2490-2499.

Nasiri, S. L. and B. A. Baum, 2004: Daytime multilayered cloud detection using multispectral imager data. *J. Atmos. Ocean. Technol*. **21**, 1145-1155.

Yang, P., Z. Zhang, and B. A. Baum, 2004: A new look at anomalous diffraction theory (ADT): Algorithm in cumulative projected-area distribution domain and modified ADT. *J. Quant. Spectros. Rad. Transfer*, **89**, 421-442.

Wei, H., P. Yang, J. Li, B. A. Baum, A. Huang, S. E. Platnick, Y-X. Hu, and L. Strow, 2004: Retrieval of semitransparent ice cloud optical thickness from Atmospheric Infrared Sounder (AIRS) measurements. *IEEE Trans. Geosci. Remote Sens*., **42**, 2254-2267.

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