

Curriculum Vitae

Matthew H. Hitchman

Research interests: Dynamics and transport in the upper troposphere / lower stratosphere, climatological analysis of global data sets, volcanic aerosol, ozone layer, regional analysis of in situ data, inertial instability, mesoscale convection, tropical cyclones

Education: University of Washington, Atmospheric Sciences, B.S. 1978; Ph.D. 1985

Professional Experience:

1985-1986	Postdoctoral Research Associate, University of Washington
1986-1988	Scientist I, National Center for Atmospheric Research
1988-1992	Assistant Professor, Meteorology, University of Wisconsin - Madison
1992-1996	Associate Professor, Atmospheric and Oceanic Sciences
1996-present	Professor, Atmospheric and Oceanic Sciences

Fall 1996	Visiting Professor, Kyoto University, Japan
1997-2000	Chair, Atmospheric and Oceanic Sciences
Spring 2006	Sabbatical, University of Reading, United Kingdom
Spring 2020	Distinguished Visiting Professor, Kyoto University, Japan

Professional Societies:

American Meteorological Society, American Geophysical Union, Japan Geophysical Union, Phi Beta Kappa

Awards:

Excellence in reviewing, AGU 1999, 2006
UW – Madison Vilas Associates Award 2003-2005
Spring 2016 - AOS Graduate Student Award for Excellence in Teaching

Current Courses Offered:

AOS 171, Global Change: Atmospheric Issues and Problems
AOS 405, Senior Capstone Seminar
AOS 610, Geophysical Fluid Dynamics I
AOS 611, Geophysical Fluid Dynamics II
AOS 705, The Middle Atmosphere
AOS 712, The General Circulation

Graduate Students Advised:

Ph.D.: Charles R. Trepte, 1993; John A. Knox, 1996; Gregory A. Postel, 1999; V. Lynn Harvey, 2001; Amihan S. Huesmann, 2004; Marcus L. Buker, 2004; Monica Harkey, 2009; Marek J. Rogal, 2009; *Yingshun Sun (current)*
M.S.: Kenneth Bywaters, 1990; William Sea, 1992; Megan McKay, 1992; Chia-Yi Yao, 1994;

Lynn Harvey, 1994; Gregory Postel, 1994; Keiko Yumi, 1996; Joleen Kugi, 1996; Marcus Buker, 1997; Marek Rogal, 2004; Andrew Parker, 2007; Elizabeth Klusinske, 2008; Nicholas Zachar, 2008; Morgan Franklin, 2008; Emily Niebuhr 2009; Shellie Rowe, 2014; Elliot Shiben 2017; Taylor Wilmot 2019; Daniel Fortier 2024; *Wenyuan Du (current)*

Post-Doctoral Research Associates: Charles R. Trepte, Philip A. Politowicz, Susan Nossal, Gregory A. Postel, V. Lynn Harvey, Chieko Kittaka, Marcus L. Buker, and Amihan S. Huesmann, Marek J. Rogal

Free on-line **textbook** in support of AOS/NIES 171: *Global Change: Humans in the Earth System*, M. H. Hitchman, 2021, 250 pp., <https://www.aos.wisc.edu/~aos171>.

Refereed Publications and Book Chapters:

1. Young, C.-H., and M. H. Hitchman, 1982: On the role of successive downstream development in East Asian polar air outbreaks. *Mon. Wea. Rev.*, **110**, 1224-1237.
2. Coy, L. and M. H. Hitchman, 1984: Kelvin wave packets and flow acceleration: a comparison of modeling and observations. *J. Atmos. Sci.*, **41**, 1875-1880.
3. Leovy, C. B., C.-R. Sun, M. H. Hitchman, E. E. Remsberg, J. M. Russell III, L. L. Gordley, J. C. Gille, and L. V. Lyjak, 1985: Transport of ozone in the middle stratosphere: evidence for planetary wave breaking. *J. Atmos. Sci.*, **42**, 230-244.
4. Hitchman, M. H. and C. B. Leovy, 1985: Diurnal tide in the equatorial middle atmosphere as seen in LIMS temperatures. *J. Atmos. Sci.*, **42**, 557-561.
5. Leovy, C. B. and M. H. Hitchman, 1985: Dynamical phenomena in the equatorial middle atmosphere during northern winter 1978-1979. In *Proceedings of the First National Workshop on the Global Weather Experiment, Current Achievements and Future Directions, Vol. 2, part 2*. National Academy Press, Washington D. C., 1985, pp. 581-591.
6. Hitchman, M. H. and C. B. Leovy, 1986: Evolution of the zonal mean state in the equatorial middle atmosphere during October 1978 - May 1979. *J. Atmos. Sci.*, **43**, 3159-3176.
7. Hitchman, M. H., C. B. Leovy, J. C. Gille, and P. L. Bailey, 1987: Quasi-stationary, zonally asymmetric circulations in the equatorial middle atmosphere. *J. Atmos. Sci.*, **44**, 2219-2236.
8. Brasseur, G. and M. H. Hitchman, 1987: The effect of breaking gravity waves on the distribution of trace species in the middle atmosphere. In *Transport Processes in the Middle Atmosphere*, Reidel Publishing Co, pp. 215-228.
9. Hitchman, M. H. and G. Brasseur, 1988: Rossby wave activity as an interactive tracer in a 2-D model: parameterization of wave driving and eddy diffusivity. *J. Geophys. Res.*, **93**, 9405-9417.
10. Hitchman, M. H. and C. B. Leovy, 1988: Estimation of the Kelvin wave contribution to the semiannual oscillation. *J. Atmos. Sci.*, **45**, 1462-1475.
11. Brasseur, G. and M. H. Hitchman, 1988: Stratospheric response to trace gas perturbations:

- changes in ozone and temperature distributions. *Science*, **240**, 634-637.
12. Brasseur, G., M. H. Hitchman, P. C. Simon, and A. De Rudder, 1988: Ozone reduction in the 1980s: A model simulation of anthropogenic and solar perturbations. *Geophys. Res. Lett.*, **15**, 1361-1364.
 13. Hitchman, M. H., J. C. Gille, C. D. Rodgers, and G. Brasseur, 1989: The separated polar winter stratopause: A gravity wave driven climatological feature. *J. Atmos. Sci.*, **46**, 410-422.
 14. Brasseur, G., M. H. Hitchman, S. Walters, M. Dymek, E. Falise, and M. Pirre, 1990: An interactive chemical dynamical radiative two-dimensional model of the middle atmosphere. *J. Geophys. Res.*, **95**, 5639-5656.
 15. O'Sullivan, D. J. and M. H. Hitchman, 1992: Inertial instability and Rossby wave breaking in a numerical model. *J. Atmos. Sci.*, **49**, 991-1002.
 16. Fritts, D. C., L. Yuan, M. H. Hitchman, L. Coy, E. Kudeki, and R. F. Woodman, 1992: Dynamics of the equatorial mesosphere observed using the Jicamarca MST radar during June and August 1987. *J. Atmos. Sci.*, **49**, 2353-2371.
 17. Hitchman, M. H., K. W. Bywaters, D. C. Fritts, L. Coy, E. Kudeki, F. Surucu, 1992: Ten day mean winds and momentum fluxes in the stratosphere and mesosphere over Jicamarca, Peru during June and August 1987. *J. Atmos. Sci.*, **49**, 2372-2383.
 18. Trepte, C. R. and M. H. Hitchman, 1992: Tropical stratospheric circulation diagnosed in satellite aerosol data. *Nature*, **355**, 626-628.
 19. Hitchman, M. H., M. A. McKay, and C. R. Trepte, 1993: "Circulation deduced from aerosol data averaged by season and phase of the quasibiennial oscillation". In *Coupling Processes in the Lower and Middle Atmosphere*, Kluwer Academic Publishers, pp. 25-34.
 20. Hitchman, M. H., M. McKay, and C. R. Trepte, 1994: A climatology of stratospheric aerosol, *J. Geophys. Res.*, **99**, 20,689-20,700.
 21. Langford, A. O., T. J. O'Leary, M. H. Proffitt, and M. H. Hitchman, 1994: Transport of the Pinatubo volcanic aerosol to a northern midlatitude site. *J. Geophys. Res.*, **100**, 9007-9016.
 22. Harvey, V. L., and M. H. Hitchman, 1996: A climatology of the Aleutian High. *J. Atmos. Sci.*, **53**, 2088-2101.
 23. Politowicz, P. A. and M. H. Hitchman, 1997: Exploring the effects of forcing quasibiennial oscillations in a two-dimensional model. *J. Geophys. Res.*, **102**, 16,481-16,497.
 24. Hitchman, M. H., 1996: "The Stratosphere", in *McGraw-Hill Scientific Encyclopedia*.
 25. Hitchman, M. H., J. M. Kugi, G. A. Postel, C.-Y. Yao, V. Lynn Harvey, E. Kudeki, C. Fawcett, D. C. Fritts, D. Riggin, D. Ortland, 1997: Mean Winds in the Tropical Stratosphere and Mesosphere During January 1993, March 1994, and August 1994. *J. Geophys. Res.*, **102**, 26,033-26,052.
 26. D. Riggin, D. C. Fritts, C. Fawcett, E. Kudeki, and M. Hitchman, 1997: Radar observations of gravity waves over Jicamarca, Peru during the CADRE campaign. *J. Geophys. Res.*, **102**, 26,263-26,282.
 27. Fritts, D., ..., M. H. Hitchman, et al., 1997: Equatorial dynamics observed by rocket, radar, and satellite during the CADRE/MALTED campaign: 2. Mean and wave structures,

- coherence, and variability. *J. Geophys. Res.*, **102**, 26,191-26,216.
28. Collimore, C. C., M. H. Hitchman, and D. W. Martin, 1998: Is there a quasi-biennial oscillation in tropical convection? *Geophys. Res. Letts.*, **25**, 333-336.
 29. Postel, G. A., and M. H. Hitchman, 1999: Climatology of Rossby wave breaking along the subtropical tropopause. *J. Atmos. Sci.*, **56**, 359-373.
 30. Harvey, V. L., M. H. Hitchman, R. B. Pierce, T. D. Fairlie, 1999: Tropical high aerosol in the Aleutian anticyclone. *J. Geophys. Res.*, **104**, 6281-6290.
 31. Hitchman, M. H., M. L. Buker, and G. J. Tripoli, 1999: Influence of synoptic waves on column ozone during Arctic summer 1997. *J. Geophys. Res.*, **104**, 26,547-26,563.
 32. Postel, G. A., and M. H. Hitchman, 2001: Observational diagnosis of a Rossby wave breaking event along the subtropical topopause. *Mon. Wea. Rev.*, **129**, 2555-2569.
 33. Huesmann, A., and M. H. Hitchman, 2001: The stratospheric quasi-biennial oscillation in the NCEP reanalysis: Climatological structures. *J. Geophys. Res.*, **106**, 11,859- 11870.
 34. Harvey, V. L., R. B. Pierce, T. D. Fairlie, and M. H. Hitchman, 2002: A climatology of stratospheric polar vortices and anticyclones, *J. Geophys. Res.*, 29 October 2002.
 35. Hitchman, M. H., M. L. Buker, G. J. Tripoli, E. V. Browell, W. B. Grant, T. J. McGee, and J. F. Burris, 2003: Non-orographic generation of arctic PSCs during December 1999. *J. Geophys. Res.*, **108**, SOL 68, 1-16.
 36. Huesmann, A. S., and M. H. Hitchman, 2003: The 1978 shift in the NCEP reanalysis stratospheric quasibiennial oscillation. *Geophys. Res. Letts.*, **30**, 2, 1048.
 37. Collimore, C. C., D. W. Martin, M. H. Hitchman, A. Huesmann, and D. Waliser, 2002: On the relationship between the QBO and tropical deep convection. *J. Climate*, **16**, 2552-2568.
 38. Hitchman, M. H., M. L. Buker, G. J. Tripoli, R. B. Pierce, J. A. Al-Saadi, E. V. Browell, M. A. Avery, 2004: A modeling study of an East Asian convective complex during March 2001. *J. Geophys. Res.*, **109**, D15S14.
 39. Pierce, R. B., J. A. Al-Saadi, T. Schaack, A. Lenzen, T. Zapotocny, D. Johnson, C. Kittaka, M. Buker, M. H. Hitchman, G. Tripoli, T. D. Fairlie, J. R. Olson, M. Natarajan, J. Crawford, J. Fishman, M. Avery, E. V. Browell, J. Creilson, Y. Kondo, and S. T. Sandholm, 2003: Regional air quality modeling system (RAQMS) predictions of the tropospheric ozone budget over East Asia. *J. Geophys. Res.*, **108**, 8825.
 40. Martin, D. W., C. C. Collimore, and M. H. Hitchman, 2003: El Nino and La Nino in highly reflective cloud. *J. Climate*, **16**, 2252-2568.
 41. Kittaka, C., R. B. Pierce, J. H. Crawford, M. H. Hitchman, D. R. Johnson, G. J. Tripoli, M. Chin, A. R. Bandy, R. J. Weber, R. W. Talbot, and B. E. Anderson: A three-dimensional regional modeling study of the impact of clouds on sulfate distributions during TRACE-P. *J. Geophys. Res.*, **109**, D15S11.
 42. Snyder, P. J., J. A. Foley, M. H. Hitchman and C. L. Delire, 2004: Analyzing the effects of tropical deforestation on climate using a detailed three-dimensional energy budget: An application to Africa. *J. Geophys. Res.*, **109**, 2156-2202.
 43. Harvey, V. L., R. B. Pierce, M. H. Hitchman, C. E. Randall, and T. D. Fairlie, 2004: On the

- distribution of ozone in stratospheric anticyclones. *J. Geophys. Res.*, **109**, D24308.
44. B ker, M. L., M. H. Hitchman, G. J. Tripoli, R. B. Pierce, E. V. Browell, and M. A. Avery, 2005: Resolution dependence of cross-tropopause ozone transport over East Asia. *J. Geophys. Res.*, **110**, D03107.
 45. Wang, P.-H., J. Fishman, L. Harvey, and M. Hitchman, 2006, Southern tropical zonal ozone wave-1 and the Hadley circulation from SAGEII observations (1985-2002). *J. Geophys. Res.*, **111**, D08305.
 46. Hitchman, M. H., and A. S. Huesmann, 2007: A seasonal climatology of Rossby wave breaking in the layer 330-2000 K. *J. Atmos. Sci.*, **64**, 1922-1940.
 47. Hitchman, M. H., and A. S. Huesmann, 2009: Effect of the Quasibiennial Oscillation on Rossby Wave breaking in the stratosphere and tropopause layer. *J. Atmos. Sci.*, **66**, 935-946.
 48. B ker, M. L., M. H. Hitchman, G. J. Tripoli, R. B. Pierce, E. V. Browell, and J. A. Al-Saadi, 2008: Long-range convective ozone transport during INTEx. *J. Geophys. Res.*, **113**, D14S90.
 49. Tuck, A. F., D. J. Donaldson, M. H. Hitchman, E. C. Richard, H. Tervahattu, V. Vaida, and J. C. Wilson, 2008: On geoengineering with sulphate aerosols in the tropical upper troposphere and lower stratosphere, *Climatic Change*, **90**(3), 315-331.
 50. Harvey, V. L., C. E. Randall, and M. H. Hitchman, 2009: Breakdown of potential vorticity-based equivalent latitude as a vortex-centered coordinate in the polar winter mesosphere, *J. Geophys. Res.*, **114**, D22105.
 51. Hitchman, M. H., and M. J. Rogal, 2009: Influence of tropical convection on the Southern Hemisphere ozone maximum during the winter to spring transition. *J. Geophys. Res.*, **114**.
 52. Hitchman, M. H., and M. J. Rogal, 2010: ENSO influences on Southern Hemisphere column ozone during the winter to spring transition, *J. Geophys. Res.*, **115**, D20104.
 53. Rogal, M., M. H. Hitchman, M. L. B ker, G. J. Tripoli, I. Stajner, and H. Hayashi, 2010: Modeling the effects of Southeast Asian monsoon outflow on subtropical anticyclones and midlatitude ozone over the Southern Indian Ocean. *J. Geophys. Res.*, **115**, D20101.
 54. France, J. A., V. L. Harvey, C. E. Randall, M. H. Hitchman, and M. J. Schwartz, 2012: A climatology of stratopause temperature and height in the polar vortex and anticyclones. *J. Geophys. Res.*, **117**, D06116
 55. Rowe, S. M., and M. H. Hitchman, 2015: On the role of inertial instability in stratosphere troposphere exchange near midlatitude cyclones. *J. Atmos. Sci.*, **72**, 2131- 2151.
 56. Welhouse, L. J., M. A. Lazzara, L. M. Keller, G. J. Tripoli, and M. H. Hitchman, 2016: Composite Analysis of the effects of ENSO events on Antarctica. *J. Clim.*, **29**, 1797-1808.
 57. Rowe, S. M., and M. H. Hitchman, 2016: On the relationship between inertial instability, poleward momentum surges, and jet intensifications near midlatitude cyclones. *J. Atmos. Sci.*, **73**, 2299-2315.
 58. Hitchman, M. H., and S. M. Rowe, 2017: On the similarity of upper tropospheric potential vorticity dipoles in tropical and midlatitude deep convection. *J. Atmos. Sci.*, **74**, 2593-2613.
 59. Hitchman, M. H., and S. M. Rowe, 2019: On the 3D structure and formation of UTLS jetlets associated with potential vorticity dipoles in tropical cyclones. *Mon. Wea. Rev.*, **147**, 4107-4125.

60. Dzambo, A. M., M. H. Hitchman, K.-W. Chang, 2019: The influence of gravity waves on the tropical tropopause layer over Darwin, Australia. *Atmosphere*, **10**, 778.
61. Lu, H., M. H. Hitchman, L. J. Gray, J. Anstey, and S. M. Osprey, 2020: On the role of Rossby wave breaking in the quasi-biennial modulation of the stratospheric polar vortex during boreal winter. *Quart. J. Royal Meteorol. Soc.*, **146**, 1939-1959.
62. Rowe, S. M., and M. H. Hitchman, 2020: The destruction of a stratospheric potential vorticity intrusion due to inertial instability in the UTLS as it relates to the 20 August 2018 Southern Wisconsin extreme flooding event. *Mon. Wea. Rev.*, **148**, 4397–4414.
63. Hitchman, M. H., and S. M. Rowe, 2020: Reply to Comment on “On the structure and formation of UTLS PV dipole/jetlets in tropical cyclones by convective momentum transport”. *Mon. Wea. Rev.*, **148**, 4697.
64. Hitchman, M. H., S. Yoden, P. H. Haynes, S. Tegtmeier, and V. Dabas, 2021: An observational history of the direct influence of the stratospheric quasi-biennial oscillation on the tropical and subtropical upper troposphere and lower stratosphere. *J. Meteorol. Soc. Jpn.*, **99**(2), 239-267.
65. Haynes, P., P. Hitchcock, M. Hitchman, S. Yoden, H. Hendon, G. Kiladis, K. Kodera, and I. Simpson, 2021: The influence of the stratosphere on the tropical troposphere. *J. Meteor. Soc. Japan*, **99**(4), 803-845.
66. Hitchman, M. H., and S. M. Rowe, 2021: On the formation of tropopause folds and constituent gradient enhancement near westerly jets. *J. Atmos. Sci.*, **78**, 2057-2074.
67. Kinoshita, T., S. Ogino, J. Suzuki, R. Shirooka, T. Sugidachi, K. Shimizu, M. H. Hitchman, 2022: Toward standard radiosonde observations of waves and the mean state in the 30–40 km altitude range using 3–kg balloons. *J. Atmos. Ocn. Tech.*, **39**, 849-860.
68. Kumar, V., S. Yoden, and M. H. Hitchman, 2022: QBO and ENSO effects on the mean meridional circulation, polar vortex, subtropical westerly jets, and long-wave pattern during boreal winter. *J. Geophys. Res.-Atmos.*, **127**, doi: 10.1029/2022JD036691.
69. Yoden, S., V. Kumar, S. K. Dhaka, and M. H. Hitchman, 2023: Global monsoon systems and their modulation by the equatorial Quasi-Biennial Oscillation. *MAUSAM*, **74**, <https://doi.org/10.54302/mausam.v74i2.5948>.
70. Kumar, V., S. K. Dhaka, M. H. Hitchman, and S. Yoden, 2023: Solar cycle influence on global cloud distribution: changes in regional tropical circulations and the role of galactic cosmic rays. *Nature Scientific Reports*.
71. Du, W., and M. H. Hitchman, 2023: Monthly mean Eliassen-Palm fluxes and EP flux divergences for boreal winter months (Dec-Jan-Feb) from 1979 to 2020 using ERA5 data [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.10140775>.
72. Kumar, Vinay, Matthew H. Hitchman, Wenyan Du, S. K. Dhaka, and Shigeo Yoden, 2024: Teleconnection of the Quasi-biennial oscillation with boreal winter surface climate in Eurasia and North America. *Nature Communications Earth & Environment*, **5:251**, <https://doi.org/10.1038/s43247-024-01422-7>.
73. Hitchman, M. H., and S. M. Rowe, 2024: On the Role of the Meridional Jet and Horizontal Potential Vorticity Dipole in the Iowa Derecho of 10 August 2020. *Mon. Wea. Rev.*, **152**,

1763-1785. <https://doi.org/10.1175/MWR-D-23-0168.s1>.

74. Hitchman, M. H., 2024: *The Stratospheric Polar Vortex*, a 10,000 word article in Encyclopedia of Atmospheric Sciences, 3rd Edition, Walter A Robinson, Ed., Elsevier.
75. Rowe, S. M., and M. H. Hitchman, 2026: On the diurnal cycle in UTLS mesoscale potential vorticity variability using 9-km resolution ECMWF operational forecast analyses: A climatology of South Pacific tropical cyclones during 2016 – 2024. *J. Atmos. Sci.*, **83**, 475-491.
76. Kumar, V., S. Yoden, M. H. Hitchman, T. Takemi, and K. Ito, 2026: QBO modulation of global monsoon systems with application to NH winter and summer for neutral to moderate ENSO conditions. *Atm. Chem. Phys.*, **26**, 4547–4569, doi.org/10.5194/acp-26-4547-2026.

Funded Grants 1987 - present

- Principal Investigator, “An Investigation of Equatorial Mesospheric Dynamics Using Jicamarca MST Radar”, NSF, \$110,000, 1/1/1987 - 12/31/1989.
- Principal Investigator, “Dynamical Investigation of the Middle Atmosphere with a 2-D Model”, NASA, \$193,000, 9/01/88 - 10/7/91.
- Principal Investigator, “Rossby Waves Entering the Equatorial Middle Atmosphere”, NSF, \$190,000, 1/01/90 - 12/31/93.
- Principal Investigator, “Dynamical and Chemical Studies of Aircraft Emissions Using Satellite Data and a 2-D Model”, NASA, \$137,000, 3/1/92 - 2/28/95.
- Principal Investigator, “Dynamical and Chemical Studies of the Middle Atmosphere Using Satellite Data and a 2-D Model”, NASA, \$310,000, 1/1/92 - 12/31/94.
- Principal Investigator, “Dynamical Studies Using SAGE II Data”, NASA, \$90,000, 5/14/93 - 5/13/96.
- Principal Investigator, “Equatorial Middle Atmosphere Coupling and Dynamics Using the Jicamarca Radar”, NSF, \$130,000, 8/1/92 - 7/31/95.
- Principal Investigator, “Climatological and Modeling Studies for SASS”, NASA, \$244,000, 5/1/94 - 4/30/97.
- Principal Investigator on “Climatological and Dynamical Studies of the Middle Atmosphere using UARS Data”, NASA, \$242,000, 1/1/95 - 12/31/97.
- Principal Investigator, “Dynamical Studies Using STRAT Data”, NASA, \$18,000, 1/1/96 - 12/31/98.
- Principal Investigator, “Climatological and Modeling Studies Using SAGE Data”, NASA, \$280,000, 1/1/96 - 12/31/98.
- Principal Investigator, “Non-hydrostatic modeling of Summer Stratospheric Mixing Processes for POLARIS”, NASA, \$30,000, 1/1/97 - 12/31/99.
- Co-I on ACPMAP grant at NASA Langley, PI Bill Grose, “Modeling Pinatubo and ENSO with the IMPACT GCM”, NASA, \$20,000, 6/1/96 - 5/31/99.
- Principal Investigator, “GSFC Cooperative Graduate Research Assistantships”, NASA, \$50,000, 9/1/98 - 8/31/99.
- Principal Investigator, “A Study of Tropical Deep Convection at Quasi-biennial and Annual Time Scales”, NSF, \$192,500, 11/1/98 - 10/31/00.
- Principal Investigator, “Modeling and Analysis of SAGE Constituent Mixing in the Lower Stratosphere”, NASA, \$384,249, 6/20/99 - 6/19/02.

Principal Investigator, “McKinney Fellowship in Atmospheric and Oceanic Sciences”, University of Wisconsin Foundation, \$27,000 for each of five years, 1999-2004.

Co-I on ACMAP grant at NASA Langley, PI Brad Pierce, “Modeling and Analysis of Transport and Photochemistry in the Lower Stratosphere”, NASA, 92K, 11/1/99-10/31/2002.

Principal Investigator, “GSFC Cooperative Research for MODIS”, NASA, \$70,000, 8/1/00-7/30/2001

Principal Investigator, “A Study of Tropical Deep Convection at Quasi-biennial and Annual Time Scales”, NSF, \$100,000, November 1, 2001 - October 31, 2002.

Co-Investigator, PI Jim Crawford, “Mesoscale to Global Modeling Studies of Stratosphere - Troposphere Exchange for TRACE-P”, NASA, \$90,000, 2/1/01 - 1/31/04.

Co-Investigator with NASA-LARC PI Brad Pierce, “UWNMS Component of RAQMS - A Regional Air Quality Modeling System”, NASA, \$90,000, March 1, 2001 - February 28, 2005.

Principal Investigator, “Analysis of Dynamical Processes Important to Climate Change”, NASA, \$360,000, 9/1/01 - 8/31/04.

Vilas Associate Award for excellence in research in the Physical Sciences Division, University of Wisconsin-Madison, 2 months summer salary plus \$12,000 research, 2003-2005.

Principal Investigator, “Dynamical and Microphysical Studies of Tropical Cloud Systems”, NASA, \$345,089, 10/1/04 - 9/30/07.

Co-Investigator with NASA-LARC PI Brad Pierce, “UWNMS Component of RAQMS - A Regional Air Quality Modeling System”, NASA, \$40,000 per year.

Principal Investigator, “Influence of the Tibetan High Outflow on the Southern Hemisphere Column Ozone Distribution”, NSF, \$310,000, 3/1/04 - 2/28/07.

Principal Investigator, “Effects of Anthropogenic Ice Nuclei on Moistening of the Stratosphere”, Graduate School, \$17,000, 7/1/05 - 6/30/06.

Co-Investigator, PI Hongyu Liu, “Constraints from AURA Observations on the Impact of Convection and Lightning on Upper Tropospheric Chemistry”, NASA, \$430,500, 1/1/05 - 12/31/07.

Principal Investigator, “Natural Climate Variability and Transport Processes in the UTLS”, NASA, \$392,226, 9/1/06 - 8/31/09.

Co-investigator, “Multi-scale chemical forecasting and assimilation studies in support of AURA validation and science during INTEX-NA”, PI Brad Pierce, NASA, \$150,000, 1/1/05 - 12/31/08.

Principal Investigator, Collaborative Research with U. Texas - Arlington, “Dynamics of Carbon Release and Sequestration: Case Studies of two Early Eocene Hyperthermals”, \$19,401, 9/1/08 - 12/31/08.

Principal Investigator, “Subtropical Anticyclonic Forcing of the Antarctic Stratosphere”, NSF, \$434,037, 7/1/08 - 6/30/11.

Principal Investigator, “Dynamical Analysis of Modeled Ozone Structures in the UTLS over North America”, NASA, \$513,864, 4/1/2010 - 3/31/2013.

Principal Investigator, “On the role of inertial instability in stratosphere-troposphere exchange and precipitation maxima in midlatitude winter cyclones”, UW- Madison, \$33,969, 7/15/2012 – 7/14/2013.

Principal Investigator, “Sensitivity of Southern Hemispheric Atmospheric Structures to Tropical Forcing”, NSF, \$550,021, April 1, 2013 - March 31, 2016

Principal Investigator, “Modeling and Observational Studies of Inertial Instability Near the Tropopause”, NSF, \$606,068, 04/01/16 - 03/31/20.

Principal Investigator, “Numerical and Observational Studies of UTLS Potential Vorticity Dipoles in Midlatitude and Tropical Cyclones”, NSF, \$729,924, 04/01/20 - 03/31/24.

Principal Investigator, “The Diurnal Cycle and Evolution of Mesoscale Potential Vorticity Variability in Tropical Cyclones”, Graduate School Research Committee, UW-Madison, \$54,941, 2/1/24–7/19/25.

Recent Public Lectures, invited seminars, papers presented at professional meetings

February 1, 2023, “Application of a Cloud-top PV Activity Index to the Evolution and Diurnal Cycle of Tropical Cyclone Yasa, Atmospheric and Oceanic Sciences Department Seminar

February 8, 2023, “On the formation of tropopause folds and constituent gradient enhancement near westerly jets.”, AOSS poster session.

February 8, 2023, “Application of a cloud-top PV activity index to the evolution and diurnal cycle of tropical cyclone Yasa”, AOSS poster session, presented by co-author Shellie Rowe.

February 8, 2023, “Lower tropospheric horizontal potential vorticity dipole and equatorward outflow in the Iowa derecho of 10 August 2020.”, AOSS poster session, presented by co-author Shellie Rowe.

February 8, 2023, “PV cloud activity index applied to seven Caribbean tropical storms during 2020.”, AOSS poster session, presented by co-author Daniel Fortier.

February 26, 2024, “On the formation of tropopause folds and constituent gradient enhancement near westerly jets.”, AOSS poster session.

February 26, 2024, “Application of a cloud-top PV activity index to the evolution and diurnal cycle of tropical cyclone Yasa”, AOSS poster session, presented by co-author Shellie Rowe.

February 26, 2024, “Lower tropospheric horizontal potential vorticity dipole and equatorward outflow in the Iowa derecho of 10 August 2020.”, AOSS poster session, presented by co-author Shellie Rowe.

June, 2024, “QBO Phase Binning Methods and Seasonal Influence on the Subtropical Westerly Jets”, presented by first author Yingshun Sun, AMS Middle Atmosphere Meeting, Burlington, VT.

March 10, 2025, “AOS Faculty Flash Talk”, Madison, WI.

April 25, 2025, “Relationship between the polar vortex and Madison temperatures this year”, Weather Watch.

January, 2026, “QBO Phase Binning Methods and Seasonal Influence on the Subtropical Westerly Jets”, presented by first author Yingshun Sun, AMS Meeting, Houston, TX.

January, 2026, “Seasonal Influence of ENSO and the QBO on Meridional Momentum Transport Associated with the Tropical Waveguide”, presented by first author Wenyan Du, AMS Meeting, Houston, TX.

March 9, 2026, “AOS Faculty Flash Talk”, Madison, WI.

Service

a) Department

AOS Department Chair (1997 – 2000)
Chair, Curriculum Committee (2021 – present)
Chair, Assessment Committee (2020 – present)
Chair Awards Committee (2020-2021)
Merit Review Committee (2023, 2024)
Ned Smith Professorship Selection Committee (2024)
Mentor Committee for Till Wagner (2022 – 2025)

b) College of Letters and Science

Graduate School Research Committee, 2004 - 2007
Physical Sciences Divisional Committee, 2007-2010, 2015
Faculty Senate (2017 – present)
L & S Forward Working Group on B.A. and B.S. degree requirements review/revision (2024)
L & S Teaching & Learning Liaison (2025 - present)
L & S Curriculum Committee (2025 - present), Chair subcommittee to revise criteria for LAS (Liberal Arts and Sciences) designation
Chair subcommittee to revise criteria for LAS (Liberal Arts and Sciences) designation
Digital Accessibility Liaison (2025 – present)
L&S task force to update current learning outcomes for Physical and Biological Sciences (2026)

d) National and International

UCAR Member Representative for UW-Madison for 27 years (1995-2021)
Science Team Member: SAGE II, UARS, STRAT, POLARIS, SOLVE, TRACE-P, INTEx, Aura
Member SATIO-TCS SPARC working group (2018 – present)
Co-Convenor of 2nd International Symposium on the Whole Atmosphere (ISWA2), U. Tokyo, June 6-9 2027.
External program reviewer of the Department of Earth and Environmental Science at the University of Texas Arlington for their undergraduate and graduate programs in Earth and Environmental Sciences, October 2026, Arlington, TX.

e) Provided ~70 reviews of journal articles, manuscripts and proposals during the past three years.