

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

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

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 2023

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

On-line textbook for 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. Riggan, 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. Riggan, 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. Buker, 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. Buker, 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. Buker, 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.

Selected service activities:

AOS Department Chair, August 1997 - 2000

Chair, Curriculum Committee, Assessment Committee

Graduate School Research Committee, 2004 - 2007

Physical Sciences Divisional Committee, 2007-2010, 2015

UW - Madison Faculty Senate

UCAR Member Representative for UW-Madison 1995-2021

Science Team: SAGE II, UARS, STRAT, POLARIS, SOLVE, TRACE-P, INTEX, Aura

Steering Committee, Stratospheric and Tropospheric Influences on Tropical Convective Systems (SATIO-TCS), a Stratospheric Processes and their Role in Climate (SPARC) initiative

Review 15-20 journal articles and proposals per year