Eric A. Ray

Education

Ph.D. Atmospheric Sciences, University of Washington, June 1997.
M.S. Atmospheric Sciences, University of Washington, August 1993.
B.A. Physics and Astrophysics, University of California at Berkeley, May 1990.

Experience

Senior Research Scientist, Cooperative Institute for Research in Environmental Sciences, University of Colorado, NOAA/CSL, May 2020-present.

Research Scientist III, Cooperative Institute for Research in Environmental Sciences, University of Colorado, NOAA/CSD, October 2008-May 2020.

Research Scientist II, Cooperative Institute for Research in Environmental Sciences, University of Colorado, NOAA/AL, November 2000-September 2008; NOAA/CMDL, April-November 2000.

Research Scientist I, Cooperative Institute for Research in Environmental Sciences, University of Colorado, NOAA/CMDL, August 1998-April 2000.

National Research Council Research Associate, NOAH Group, NOAA/CMDL, July 1997-July 1998. Advisor: Dr. James W. Elkins.

Graduate Research Assistant, Department of Atmospheric Sciences, University of Washington, July 1990-May 1997. Advisor: Prof. James R. Holton.

Selected Awards

CIRES Science and Engineering Outstanding Performance Award in 2019
Colorado-LABS Governor's Award for High-Impact Research, PI (2019)
2 CIRES Bronze Awards in 2007 and 2013
9 NASA Group Achievement Awards (1997-2018)

Selected Publications

Ray, E. A., R. W. Portmann, P. Yu, J. Daniel, S. A. Montzka, G. S. Dutton, B. D. Hall, F. L. Moore and K. H. Rosenlof, The stratospheric quasi-biennial oscillation influence on trace gases at the Earth's surface, *Nature Geosci*., 10.1038/s41561-019-0507-3, 2019.

Williamson, C. J.,…, **E. A. Ray**, et al., A large source of cloud condensation nuclei from new particle formation in the tropics, *Nature*, 10.1038/s41586-019-1638-9, 2019.

Montzka, S. A., G. S. Dutton, D. Mondeel, C. Siso, P. Yu, **E. A. Ray,** et al., An unexpected and persistent increase in global emissions of ozone-depleting CFC-11, *Nature*, 557, 10.1038/s41586-018-0106-2, 2018.

Ray, E. A., F. L. Moore, J. W. Elkins, K. H. Rosenlof, J. C. Laube, T. Rockmann, D. R. Marsh, and A. E. Andrews, Quantification of the SF_6 lifetime based on mesospheric loss measured in the stratospheric polar vortex, *J. Geophys. Res*., 10.1002/2016JD026198, 2017.

Herman, R. L., **E. A. Ray**, et al, Enhanced stratospheric water vapor over the summertime continental United States and the role of overshooting convection, *Atmos. Chem. Phys.,* 17, 10.5194/acp-17-6113-2017.

Diallo, M., F. Ploeger, P. Konopka, T. Birner, R. Muller, M. Riese, H. Garny, B. Legras, **E. A. Ray,** G. Berthet, and F. Jegou, Significant contributions of volcanic aerosol to decadal changes in the stratospheric circulation, *Geophys. Res. Lett.*, 10.1001/2017GL074662, 2017.

Yu, P. F., H. Telg, X. Bai, S. Liu, R. W. Portmann, **E. A. Ray,** et al., Efficient transport of tropospheric aerosol into the stratosphere via the Asian summer monsoon, *Proc. Nat. Acad. Sci.*, 10.1073/pnas.1701170114, 2017.

Ray, E. A., et al., An idealized stratospheric model useful for understanding differences between long-lived trace gas measurements and global chemistry-climate model output, *J. Geophys. Res.*, 10.1002/2015JD024447, 2015.

Ray, E. A., et al., Improving stratospheric transport trend analysis based on SF_6 and CO_2 measurements, *J. Geophys. Res.*, 10.1002/2014JD021802, 2014.

Moore, F. L., **E. A. Ray,** et al., A cost effective trace gas measurement program for long term monitoring of the stratospheric circulation, *Bull. Am. Met. Soc.*, doi:10.1175/BAMS-D-12-00153.1, 2013.

Schwarz, J. P.,…, **E. A. Ray**, et al., Global-scale seasonally resolved black carbon vertical profiles over the Pacific, *Geophys. Res. Lett.*, 10.1001/2013GL057775, 2013.

Waugh, D. W.,…, **E. A. Ray**, et al., Tropospheric SF_6: Age of air from the Northern Hemisphere midlatitude surface, *J. Geophys. Res.-Atmos.*, 10.1029/2010JD015065, 2013.

Bönisch, H., A. Engel, T. Birner, P. Hoor, D. W. Tarasick and **E. A. Ray**, On the structural changes in the Brewer-Dobson circulation after 2000, *Atmos. Chem. Phys.*, 10.5194/acp-11-3937-2011.

Hurst, D. F.,…, **E. A. Ray**, et al., Stratospheric water vapor trends over Boulder, Colorado: Analysis of the 30 year Boulder record**,** *J. Geophys. Res.-Atmos.*, 10.1029/2010JD015065, 2011.

Ray, E. A., et al., Evidence for Changes in Stratospheric Transport and Mixing Over the Past Three Decades Based on Multiple Datasets and Tropical Leaky Pipe Analysis, *J. Geophys. Res.*, 10.1029/2010JD014206, 2010.

Kuester, M. A., M. J. Alexander and **E. A. Ray**, A modeling study of gravity waves over Hurricane Humberto (2001), *J. Atmos. Sci.*, 10.1175/2008JAS2372.1, 2008.

Ray, E. A. and K. Rosenlof, Hydration of the upper troposphere by tropical cyclones, *J. Geophys. Res.*, 10.1029/2006JD008009, 2007.

Ray, E. A., et al., Evidence of the effect of summertime midlatitude convection on the subtropical lower stratosphere: An analysis of tracer measurements from the CRYSTAL-FACE mission, *J. Geophys. Res.*, 10.1029/2004JD004655, 2004.

Ray, E. A., K. Rosenlof, E. Richard, D. Parrish and R. Jakoubek, Distributions of ozone in the region of the subtropical jet: An analysis of *in situ* aircraft measurements, *J. Geophys. Res.*, 10.1029/2003JD004143, 2004.

Marcy, T. P., …, **E. A. Ray**, et al., Quantifying stratospheric ozone in the upper troposphere using in situ measurements of HCl, *Science*, 304, 261-265, 2004.

Ray, E. A., et al., Descent and mixing in the northern polar stratospheric vortex inferred from in situ tracer measurements, *J. Geophys. Res.*, 2001JD000961, 2002.

Ray, E. A., et al., Transport into the Northern Hemisphere lowermost stratosphere revealed by in situ tracer measurements, *J. Geophys. Res.*, 104, 26,565-26,580, 1999.