

Curriculum Vitae of Robert B. Chatfield

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Education

Colorado State University	Ph.D.	1982	Atmospheric Science
University of Washington	M.S.	1976	Atmospheric Sciences
Rice University	B.A.	1969	Math (Chemical Physics)

Dissertation: *Remote tropospheric SO₂: Cloud transport of reactive sulfur emissions*, with Paul J. Crutzen, Nobel Prize winner, at the Max-Planck -Institut für Chemie

Professional Experience

NASA Ames Research Center (1990-2005) Researcher, Atmospheric Chemist

- Leader of a small research group. Focus: the study of source, chemical, and transport processes where they clearly require improvement in global simulations. We have a newly expanding interest in the retrieval and validation of remotely sensed trace species. Basic technique: reconcile detailed, situation-specific studies of emissions and observed chemical composition (from aircraft and satellites), and deposition, and so to check the closure of chemical and particulate budgets. We use advanced statistical techniques and the NCAR Finite Volume version of Community Atmospheric Model, and our own flexible, 0-, 1-, 2-, or 3-dimensional models for synoptic-to-global transport and transformation for idealized *or* highly experiment-specific analyses. We are collaborating with other centers including Goddard Space Flight Center, University of São Paulo, University of Virginia, University of Maryland, University of North Carolina, Harvard, and others. Strong connections with those studying land use, biomass burning, surface deposition of trace species, and gaseous emissions from soils, plants, and combustion, as they compose the great global biogeochemical cycles.

National Center for Atmospheric Research, Atmospheric Chemistry Division

- PostDoctoral fellow and Research Scientist, 1984–1990; work on transport parameterizations, oxidant chemistry, and field observations.

Contributions

Publications break significant new and tend establish new paths of research. Here are some contributions that have had a significant impact on this field:

- Science-focus specialist on NASA Instrument Incubator Program team promoting robust, elegant short-wave IR measurements using satellite-borne grating mapping spectrometers.
- remote tropospheric O₃ sondes values interpreted [1977]; Demonstrating transport of Indian Ocean Brown Cloud ozone pollution to the remote Atlantic [2003].
- conceived, analyzed and wrote a universally cited paper on a major biogenic emission, isoprene, Zimmerman et al. [1978].
- showed that cumulonimbus clouds had extraordinary effects on the global upper troposphere. The role of (CH₃)₂S as a source of new aerosol there is now a commonplace.
- demonstrated the importance of clouds in moving radical reservoirs like the peroxides which determine tropospheric cleaning power (OH radicals and O₃ buildup) [1984].
- demonstrated and estimated a simple “two-stream” model of planetary boundary layer transport that has become a standard for models that can easily treat atmospheric chemistry and physics [1987]

- demonstrated a fundamental limitation in the simulation of the atmospheric chemistry of tropospheric ozone while also providing an origin for high smog ozone over the Equatorial Atlantic [1990]. Presented wavelet analysis pointing to a separate role for lightning [2002].
- demonstrated a fundamental anomaly in the reactive nitrogen chemistry of the background troposphere, possibly implying “re-NO_x-ification” [1995]
- gave a quantitative mechanistic explanation for the “Great African Plume” and the “Subtropical Global Plume” describing the pollution of the Atlantic and global tropics from biomass burning [1988, 2000].
- provided provocative evidence that aircraft NO_x plays an environmentally significant role in the troposphere above 6 km, and other sources have limited effects [1999].

Honors, Science Teams, Scientific Societies

- **Science Teams:** NASA Instrument Incubator Program, Global Modeling Initiative, Global Tropospheric Experiment, EOS Interdisciplinary Science, Aura Validation Science Teams
- **NASA Professional Development Program at NASA Headquarters, 2000–2001.**
- **American Geophysical Union** – **Annual Invited Lecturer** at U.C. Berkeley

Publications

Selected publications. See web page for recent papers in PDF and recent presentations.

- Chatfield, R., H. Guan, A.M. Thompson, and H. Smit, Mechanisms for the Intraseasonal Variability of Tropospheric Ozone over the Indian Ocean during the Winter Monsoon, submitted to *J. Geophys. Res.*, 2006JD007347, 2006.
- Chatfield, R.B., H. Guan, A.M. Thompson, J. Witte, Convective Lofting Links Indian Ocean Air Pollution to Paradoxical South Atlantic Ozone Maxima, *Geophys. Res. Lett.*, *31*, L06103, doi:10.1029/2003GL018866, 2004.
- Chatfield R. B., Z. Guo, G. W. Sachse, D. R. Blake, and N. J. Blake, The subtropical global plume in the Pacific Exploratory Mission-Tropics A (PEM-Tropics A), PEM-Tropics B, and the Global Atmospheric Sampling Program (GASP): How tropical emissions affect the remote Pacific, *J. Geophys. Res.*, *107* (D16), doi:10.1029/2001JD000497, 2002.
- Folkins, I., and R.B. Chatfield, Impact of acetone on ozone production and OH in the upper troposphere at high NO_x, *J. Geophys. Res.*, *105*, 11,585–11,599, 2000
- Chatfield, R.B., “Atmospheric Composition and Structure” and “Atmospheric Motions and the Greenhouse Effect,” *Earth System Science: Processes and Issues*, ed., G. Ernst, Cambridge University Press, 2000.
- Chatfield, R.B., J.A. Vastano, L. Li, G.W. Sachse, and V.S. Connors, The Great African Plume from biomass burning: A three-dimensional study of Trace-A carbon monoxide, *J. Geophysical Res.*, *103*, 28,059–28,077, 1998.
- Chatfield, R.B., J.A. Vastano, H.B. Singh, and G.W. Sachse, A generalized model of how fire emissions and chemistry produce African / oceanic plumes (O₃, CO, PAN, smoke) seen in Trace-A, *J. Geophysical Res.*, *101*, 24,279–24,306, 1996.
- Chatfield, R.B., Anomalous HNO₃/NO_x ratio of remote tropospheric air: Conversion of nitric acid to formic acid and NO_x?, *Geophys. Res. Lett.*, *21*, 2705–2708, 1994.
- Chatfield, R.B., and A. C. Delany, Convection links biomass burning to increased tropical ozone: However, models will tend to overpredict O₃, *J. Geophysical Res.*, *95*, 18473–18488, 1990.
- Chatfield, R.B., and P. J. Crutzen, Are there interactions of iodine and sulfur species in marine air photochemistry?, *J. Geophysical Res.*, *95*, 22319–22341, 1990.
- Ferek, R.J., R.B. Chatfield, and M.O. Andreae, Vertical distribution of dimethylsulfide in the marine atmosphere: implications for the atmospheric sulfur cycle, *Nature*, *320*, 514–516, 1986.
- Chatfield, R.B. and P.J. Crutzen, Sulfur dioxide in remote oceanic air: Cloud transport of reactive precursors, *J. Geophys. Res.*, *89*, 7111–7132, 1984.
- Zimmerman, P.R., R.B. Chatfield, J. Fishman, P.J. Crutzen, and P.L. Hanst, Estimates of the production of CO and H₂ from the oxidation of hydrocarbon emissions from vegetation, *Geophys. Res. Lett.*, *5*, 679–682, 1978.