

Charles D. Camp

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Education

Ph.D., Applied and Computational Mathematics, California Institute of Technology, June 2004.

Thesis title: Spatial and Temporal Patterns of the Interannual Variability of Stratospheric Ozone and Dynamics.

Advisor: Professor Yuk L. Yung, Division of Geological and Planetary Sciences.

B.A., Mathematics with Minors in Physics and Music; University of California, San Diego, 1989.

Research Interests

- Development and implementation of techniques for multivariate time series analysis and mathematical modeling.
- Geophysical fluid dynamics, climate change.

Research Experience

Postdoctoral Research Associate, University of Washington (2004–present):

- Development of statistical techniques for identifying patterns of variability in multivariate time series.
- Implementation of statistical techniques to identify influences of cycles of solar and atmospheric variability on stratospheric and tropospheric climate.

Graduate Student, Caltech (1991-2004):

- Interactions between chemical composition and dynamics of the Earth's atmosphere; modeling and data analysis.
- Data analysis techniques, particularly for multivariate time series analysis.
- Intermediate models for geophysical fluid dynamics: advection of potential vorticity.
- Nonlinear dynamics, pattern formation and their application to atmospheric dynamics: modeling atmospheric blocking (under Professor Michael C. Cross, Department of Physics).

Research conducted at Los Alamos National Laboratory (Summer 1993):

- Global climate modeling in extended time steps on massively-parallel computing architecture.

Analyst, Areté Associates, Inc., San Diego, CA (1989-1991):

- Physical Oceanography: Non-linear simulation of ocean surface waves; geometric and acoustic properties of near-surface bubble clouds; acoustic ray propagation in the deep ocean.

Undergraduate research, UCSD (1989):

- Chaos and fractals: Measuring the fractal dimension of iterated function systems (under Dr. Yuval Fisher).

Teaching Experience

Instructor, University of Washington (2005–present):

- *Vector Calculus and Complex Analysis* (upper division and first year graduate class); Responsibilities include lecturing 4 hours per week to more than 50 in-class students, lectures are taped and broadcast online for 3 distance-learning students, supervising two teaching assistants.
- *Introduction to Continuous Mathematical Modeling* (to be taught Winter 2006; survey of the mathematical modeling of physical, biological and financial systems primarily using differential equations.)

Teaching Assistant, Caltech (1991-2004):

- *Introductory Methods of Applied Mathematics* (functions of a complex variable, linear ordinary differential equations and partial differential equations, boundary value problems, special functions, eigenfunction expansions, integral transforms).
- *Methods of Applied Mathematics* (analytic methods for ordinary differential equations and partial differential equations, asymptotic expansions, WKB theory).
- *Methods in Applied Statistics and Data Analysis* (multiple linear regression, regularization of ill-posed and rank-deficient problems, principal component analysis, discriminant analysis)
- *Bifurcation Theory and Nonlinear Boundary Value Problems*.
- *Introduction to Complex Systems* (nonlinear dynamics, non-equilibrium physics, dissipative chaos and pattern formation).
- *Global Environmental Science: Weather and Climate*.
- Responsibilities included preparing and presenting lectures for weekly one-hour sections, creating and grading homework and test questions, tutoring students individually and in groups.

Teaching Assistant, University of California, San Diego (1987-1989):

- Teaching Assistant Coordinator, supervising other teaching assistants and acting as liaison between professors and other teaching assistants and students.
- Taught *Calculus* and *Pre-Calculus*.

Mentoring

Co-mentored, with Professor Yuk Yung, two Summer Undergraduate Research Fellowship students, T. Liao and N. Sheetz, in work related to the analysis of atmospheric time series. Results from the work with T. Liao were published in Liao, *et. al.*, GRL, 2004. Results from the work with N. Sheetz, “Presence of a Madden-Julian Oscillation Signal in the TOMS Ozone Data,” were presented at the American Geophysical Union meeting in 2002.

Professional Employment

Areté Associates, Inc., Programmer/Analyst, San Diego, CA, 1989-1991

Honors and Awards

Teaching Assistant Award, Caltech Graduate Student Council, 2002.

Provost’s Honors List, University of California, San Diego.

Professional Activities

Organized and hosted speakers for a weekly seminar series focusing on atmospheric dynamics, chemistry and climate.

Member of the American Mathematical Society, the Society for Industrial and Applied Mathematics, the Mathematical Association of America, American Geophysical Union, and the American Meteorological Society.

Other interests

Classical piano, environmental issues, hiking and backpacking.

Publications

“The Influence of the Solar Cycle and QBO on the Late Winter Stratospheric Polar Vortex”, C. D. Camp and K.-K. Tung, submitted to *Journal of the Atmospheric Sciences*, 2005.

“Interannual Variability in High Latitude Stratospheric Ozone”, X. Jiang, C. D. Camp, R.-L. Shia, D. K. Jeev, V. Limpasuvan, Y. L. Yung, submitted to the *Journal of Geophysical Research*, 2005

“The Seasonal Cycle of N₂O”, T. Liao, C. D. Camp and Y. L. Yung, *Geophysical Research Letters*, **31**, L17108, doi:10.1029/2004GL020345, 2004.

“QBO and QBO-annual Beat in the Tropical Total Ozone Column: A Two-dimensional Model Simulation”, X. Jiang, C. D. Camp, R.-L. Shia, D. Noone, C. Walker and Y. L. Yung, *Journal of Geophysical Research*, **109**, D16305, doi:10.1029/2003JD004377, 2004.

“Temporal and Spatial Patterns of the Interannual Variability of Total Ozone in the Tropics”, C. D. Camp, M. S. Roulston, Y. L. Yung, *Journal of Geophysical Research*, **108** (D20), 4643, doi:10.1029/2001JD001504, 2003.

“The Sensitivity of Tropospheric Methane to the Interannual Variability in Stratospheric Ozone”, C. D. Camp, M. S. Roulston, A. F. C. Haldemann, Y. L. Yung, *Chemosphere-Global Change Science*, **3**, 147-156, (2001).

Reprints and preprints available online at <http://www.amath.washington.edu/~cdcamp/>

Presentations

Invited:

“Stratospheric Dynamics and Ozone: Impacts of the QBO, ENSO and the Solar Cycle (?)”, NASA Jet Propulsion Laboratory, Atmospheric Chemistry, Radiation and Dynamics Seminar, December, 2003

Other:

“Discriminants of global stratospheric variability related to the equatorial QBO and the 11-year solar cycle”, American Meteorological Society, Cambridge, MA, June 2005 (poster, with K.-K. Tung)

“Solar cycle variation in the ozone distribution simulated by a two-dimensional chemistry transport model”, American Geophysical Union Fall Meeting, San Francisco, CA, December 2003

“Long Term Trends in the Radiative Heating Rates and Planetary Wave Activity in the Winter Polar Stratosphere”, American Geophysical Union Fall Meeting, San Francisco, CA, December 2002 (poster, with X. Jiang, R.-L. Shia, Y. L. Yung, C. Shih).

“Stratospheric Dynamics and the 2002 Antarctic Ozone Hole”, Caltech, Planetary Science Seminar, November 2002.

“Empirical Orthogonal Functions and an Analysis of Tropical Ozone”, Caltech, Planetary Science Seminar, October 2001.

“The Sensitivity of Tropospheric Methane to the Interannual Variability in Stratospheric Ozone”, Total Ozone Mapping Spectrometer (TOMS) Science Team Annual Meeting, Huntsville, AL, May 2000.

“Presence of a Madden-Julian Oscillation Signal in the TOMS Ozone Data”, American Geophysical Union Fall Meeting, San Francisco, CA, December 2002 (poster, with N. A. Sheetz, Y. L. Yung).

“Spatiotemporal Patterns of the Interannual Variability of Total Ozone in the Tropics”, American Geophysical Union, Fall Meeting, San Francisco, CA, December 2001 (poster, with M. S. Roulston, Y. L. Yung).