

Vincent E. Larson

Department of Mathematical Sciences
University of Wisconsin – Milwaukee
P. O. Box 413
Milwaukee, WI 53201-0413
(414) 229-5490
vlarson at uwm dot edu
<http://www.uwm.edu/~vlarson>

Education **Massachusetts Institute of Technology**, Cambridge, MA
Ph.D. Department of Earth, Atmospheric, and Planetary Science, degree granted February 1999. Thesis: The Effects of Thermal Radiation on Dry Convection. Advisor: Kerry Emanuel.

Yale University, New Haven, CT
Bachelor of Arts, Physics, Magna Cum Laude, Distinction in the Major, May 1992.

Research Experience **Department of Mathematical Sciences, University of Wisconsin — Milwaukee**
Associate Professor (Sep. 2006 —), Assistant Professor (Jan. 2001 – Aug. 2006): Numerical and theoretical research on clouds, atmospheric boundary layers, microphysics, radiative transfer, CO₂ transport, and climate.

CIRA, Colorado State University
Postdoctoral Fellow (Jan. 1999 — Dec. 2000): Theoretical studies of cloud modeling, and design and execution of field experiments on thin mid-level clouds. Co-advisors: Thomas Vonder Haar, William Cotton.

MIT Department of Earth, Atmospheric, and Planetary Sciences
Graduate Student Research Assistant: Theoretical studies of convection and buoyant fluid flows.

Awards Research Growth Initiative Awards. Awarded by University of Wisconsin — Milwaukee for 3 consecutive years (2006/07, 2007/08, and 2008/09).

Graduate School Research Committee Award, worth \$14,863. Awarded by University of Wisconsin — Milwaukee, 2002–2003.

Service During the calendar year 2005, I served as an Associate Editor of *Monthly Weather Review*.

I was a moderator for the session “Upper Troposphere Clouds” in the 11th Conference on Cloud Physics, Ogden UT, June 2002, sponsored by the American Meteorological Society.

I served on an NSF review panel in Washington D.C., and I have reviewed grant proposals for the National Science Foundation and Department of Energy. I have reviewed manuscripts for *Journal of the Atmospheric Sciences*, *Quarterly Journal of the Royal Meteorological Society*, *Journal of Climate*, *Geophysical Research Letters*, *JGR — Atmospheres*, *Monthly Weather Review*, *Dynamics of Atmospheres and Oceans*, *J. Atmospheric and Oceanic Technology*, and *Weather and Forecasting*.

- Publications 2007: “Elucidating model inadequacies in a cloud parameterization by use of an ensemble-based calibration framework.” J.-C. Golaz, V. E. Larson, J. A. Hansen, D. P. Schanen, and B. M. Griffin. *Mon. Wea. Rev.*, **135**, 4077–4096.
- 2007: “A single-column model intercomparison of a heavily drizzling stratocumulus-topped boundary layer.” M. C. Wyant, C. S. Bretherton, A. Chlond, B. M. Griffin, H. Kitagawa, C.-L. Lappen, V. E. Larson, A. Lock, S. Park, S. R. de Roode, J. Uchida, M. Zhao, and A. S. Ackerman. *J. Geophys. Res.*, **112**, D24204, doi:10.1029/2007JD008536.
- 2007: “From cloud overlap to PDF overlap.” V. E. Larson. *Quart. J. Royal Met. Soc.*, **133**, 1877–1891, doi:10.1002/qj.165.
- 2007: “What causes partial cloudiness to form in multilayered midlevel clouds? A simulated case study.” M. J. Falk and V. E. Larson. *J. Geophys. Res.*, **112**, D12206, doi:10.1029/2006JD007666.
- 2007: “An analytic longwave radiation formula for liquid layer clouds.” V. E. Larson, K. E. Kotenberg, and N. B. Wood. *Mon. Wea. Rev.*, **135**, 689–699.
- 2006: “What determines altocumulus dissipation time?” V. E. Larson, A. J. Smith, M. J. Falk, K. E. Kotenberg, and J.-C. Golaz. *J. Geophys. Res.*, **111**, D19207, doi:10.1029/2005JD007002.
- 2005: “Supplying Local Microphysics Parameterizations with Information about Subgrid Variability: Latin Hypercube Sampling.” V. E. Larson, J.-C. Golaz, H. Jiang, and W. R. Cotton. *J. Atmos. Sci.*, **62**, 4010–4026.
- 2005: “Using probability density functions to derive consistent closure relationships among higher-order moments.” V. E. Larson and J.-C. Golaz. *Mon. Wea. Rev.*, **133**, 1023–1042.
- 2004: “Prognostic equations for cloud fraction and liquid water, and their relation to filtered density functions.” V. E. Larson. *J. Atmos. Sci.*, **61**, 338–351.
- 2002: “Small-scale and mesoscale variability in cloudy boundary layers: Joint three-dimensional probability density functions.” V. E. Larson, J.-C. Golaz, and W. R. Cotton. *J. Atmos. Sci.*, **59**, 3519–3539.
- 2002: “A PDF-based model for boundary layer clouds. Part I: Method and model description.” J.-C. Golaz, V. E. Larson, and W. R. Cotton. *J. Atmos. Sci.*, **59**, 3540–3551.
- 2002: “A PDF-based model for boundary layer clouds. Part II: Model results.” J.-C. Golaz, V. E. Larson, and W. R. Cotton. *J. Atmos. Sci.*, **59**, 3552–3571.
- 2002: “Observed Microphysical Structure of Mid-level, Mixed-Phase Clouds.” R. P. Fleishauer, V. E. Larson, and T. H. Vonder Haar. *J. Atmos. Sci.*, **59**, 1779–1804.
- 2001: “The Effects of Thermal Radiation on Dry Convective Instability.” V. E. Larson. *Dynamics of Atmospheres and Oceans*, **34**, 45–71.

2001: “The Death of an Altocumulus Cloud.” V. E. Larson, R. P. Fleishauer, J. A. Kankiewicz, D. L. Reinke, and T. H. Vonder Haar. *Geophys. Res. Lett.*, **28**, 2609–2612.

2001: “Small-scale and Mesoscale Variability of Scalars in Cloudy Boundary Layers: One-dimensional Probability Density Functions.” V. E. Larson, R. Wood, P. R. Field, J.-C. Golaz, and T. H. Vonder Haar. *J. Atmos. Sci.*, **58**, 1978–1994.

2001: “Systematic Biases in the Microphysics and Thermodynamics of Numerical Models that Ignore Subgrid-scale Variability.” V. E. Larson, R. Wood, P. R. Field, J.-C. Golaz, and T. H. Vonder Haar. *J. Atmos. Sci.*, **58**, 1117–1128.

2000: “Stability Properties of and Scaling Laws for a Dry Radiative-Convective Atmosphere.” V. E. Larson. *Q. J. R. Meteorol. Soc.*, **126**, 145–171.

1999: “The Relationship Between the Transilient Matrix and the Green’s Function for the Advection-Diffusion Equation.” V. E. Larson. *J. Atmos. Sci.*, **56**, 2447–2453.

Invited Talks “Parameterizing the joint overlap of moisture and temperature.” Invited by Dr. Phil Rasch, NCAR, to speak at the CGD seminar series, Boulder, CO, 4 Dec 2007.

“The forgotten clouds.” Invited by Mark Kulie, University of Wisconsin — Madison, to speak at the colloquium series in the Dept. of Atmospheric and Oceanic Sciences, 5 Nov 2007.

“Figuring out why your model is wrong.” Invited by Prof. Richard Johnson, Colorado State University, to speak at the weekly seminar in the Dept. of Atmospheric Science, 19 Apr 2007.

“Multiscale modeling, clouds, and climate.” Invited by Professor Noboru Nakamura, U. of Chicago, to speak at the Dept. of Geosciences seminar series, Chicago, IL, 2 Feb 2007.

“Parameterizing cloud layers and their microphysics.” Invited by Dr. Phil Rasch, NCAR, to speak at the CGD seminar series, Boulder, CO, 21 Mar 2006.

“Parameterizing cloud layers and their microphysics.” Invited by Prof. Robert Rauber, U. of Illinois, to speak at the departmental seminar series, Urbana-Champaign, IL, 16 Mar 2006.

“Higher-order closures and cloud parameterizations.” Invited by Dr. João Teixeira, Naval Research Laboratory, to speak at the Workshop on the Parameterization of the Atmospheric Boundary Layer, Lake Arrowhead, CA, 15 Jun 2005.

“Some thoughts on cloud parameterization.” Invited by Professor Michael Montgomery, Colorado State University, to speak at the weekly seminar series at Colorado State University, 3 Mar 2005.

“‘Have ice crystals gotten into bad habits?’ and other questions from a field experiment on

mid-level clouds.” Invited by James Frederick to speak at a chapter meeting of the American Meteorological Society, 22 Apr 2002.

“How Convexity affects the Physics and Simulation of Fluid Dynamics.”
Invited by Professor Raymond Shaw to speak at the Physics Department seminar series at Michigan Technological University, 15 Mar 2001.

Funding 2008–2009: **University of Wisconsin — Milwaukee**, Research Growth Initiative Award, “Mixed-phase layer clouds in the Arctic and mid-latitudes.” \$75,008.

2007–2008: **University of Wisconsin — Milwaukee**, Research Growth Initiative Award, “A boundary-layer parameterization for weather forecast models.” \$68,018.

2007 – 2009: **NASA**, “Multiscale modeling of aerosol impacts on clouds and precipitation.” PI Steven Ghan. Co-Is Vincent Larson et al. V. Larson’s approximate budget: \$180,000

2006 – 2008: **National Science Foundation**, “Connecting vertical velocity and microphysics at the subgrid scale in general circulation models.” \$214,628.

2006–2007: **University of Wisconsin — Milwaukee**, Research Growth Initiative Award, “Global climate and the carbon cycle.” \$86,219.

2005 – 2007: **National Science Foundation**, “Cloud Modeling and Probability Density Functions.” \$284,568.

2003 – 2006: **National Science Foundation**, “Dyn. of Altocumulus Clouds.” \$240,311.

2002–2007: **Colorado State University**, “A theoretical and numerical study of altocumulus clouds.” \$247,586.

2002–2003: **University of Wisconsin — Milwaukee**, Graduate School Research Committee Award, “Clouds and forecasts of weather and climate.” \$14,863.

2001–2002: **Colorado State University**, “A theoretical and numerical study of mid-level clouds.” \$40,672.

2001–2002: **Colorado State University**, “A numerical study of mid-level clouds.” \$28,963.

Conference Papers “Diagnosing structural errors in climate model parameterizations.” V. E. Larson and J.-C. Golaz, J. A. Hansen, D. P. Schanen, and B. M. Griffin, 2008. Preprints, *Twentieth Conference on Climate Variability and Change*, New Orleans, Louisiana, American Meteorological Society.

“Coupling microphysics parameterizations to cloud parameterizations.” V. E. Larson and B. M. Griffin, 2006. Preprints, *Twelfth Conference on Cloud Physics*, Madison, Wisconsin, American Meteorological Society.

“A simulation of partial cloudiness in multilayered altocumuli.” M. J. Falk and V. E. Larson, 2006. Preprints, *Twelfth Conference on Cloud Physics*, Madison, Wisconsin, American Meteorological Society.

“Comparison of large-eddy simulations with a single-column model: Implications for mid-level cloud parameterization.” A. J. Smith, B. M. Griffin, J.-C. Golaz, and V. E. Larson, 2006. Preprints, *Twelfth Conference on Cloud Physics*, Madison, Wisconsin, American Meteorological Society.

“Derivation and tests of the GCSS analytic longwave radiation formula.” K. E. Kotenberg, N. B. Wood, and V. E. Larson, 2006. Preprints, *Twelfth Conference on Atmospheric Radiation*, Madison, Wisconsin, American Meteorological Society.

“Deriving prognostic equations for cloud fraction and liquid water content.” V. E. Larson, 2004. Preprints, *Fourteenth International Conference on Clouds and Precipitation*, Bologna, Italy, International Commission on Clouds and Precipitation.

“Subgrid-scale CCN activation.” J.-C. Golaz, S. Wang, and V. E. Larson, 2004. Preprints, *Fourteenth International Conference on Clouds and Precipitation*, Bologna, Italy, International Commission on Clouds and Precipitation.

“Turbulent and radiative structure of altocumulus clouds.” V. E. Larson, C. M. Sears, and J.-Ch. Golaz, 2002. Preprints, *Eleventh Conference on Cloud Physics*, Ogden, Utah, American Meteorological Society.

“Parameterizing boundary layer clouds using PDF methods.” V. E. Larson, J.-Ch. Golaz, and W. R. Cotton, 2001. Preprints, *Ninth Conference on Mesoscale Processes*, Ft. Lauderdale, Florida, American Meteorological Society.

“The death of a mid-level cloud.” V. E. Larson, R. P. Fleishauer, J. A. Kankiewicz, D. L. Reinke, and T. H. Vonder Haar, 2001. Preprints, *Ninth Conference on Mesoscale Processes*, Ft. Lauderdale, Florida, American Meteorological Society.

“Development of a new parameterization for representing boundary layer clouds in mesoscale models.” J.-C. Golaz, V. E. Larson, and W. R. Cotton, 2001. Preprints, *Ninth Conference on Mesoscale Processes*, Ft. Lauderdale, Florida. American Meteorological Society.

“An overview of the next complex layered cloud experiment (CLEX-9).” L. D. Carey, T. H. Vonder Haar, J. A. Kankiewicz, J. M. Davis, J. M. Forsythe, D. L. Reinke, K. E. Eis, R. P. Fleishauer, and V. E. Larson, 2001. Preprints, *Battlespace Atmospheric and Cloud Impacts on Military Operations Conference 2001*, Fort Collins, CO, Army Research Laboratory.

“Observed microphysical structure of mid-level, mixed-phase clouds.” R. P. Fleishauer, V. E. Larson, and T. H. Vonder Haar, 2001. Preprints, *Battlespace Atmospheric and Cloud Impacts on Military Operations Conference 2001*, Fort Collins, CO, Army Research Laboratory.

“Variability of thermodynamic properties of clouds.” Larson, V. E., R. Wood, P. R. Field, J.-C. Golaz, T. H. Vonder Haar, and W. R. Cotton, 2000. Preprints, *Thirteenth International Conference on Clouds and Precipitation*, Reno, NV, International Commission on Clouds and Precipitation.

“In-situ and satellite-based observations of mixed phase non-precipitating clouds and their environments.” J. A. Kankiewicz, R. P. Fleishauer, V. E. Larson, D. L. Reinke, J. M. Davis, T. H. Vonder Haar, S. K. Cox, 2000. Preprints, *Thirteenth International Conference on Clouds and Precipitation*, Reno, NV, International Commission on Clouds and Precipitation.

“Jensen’s inequality and systematic biases in numerical simulations.” V. E. Larson, R. Wood, P. R. Field, J.-C. Golaz, T. H. Vonder Haar, and W. R. Cotton, 2000. Preprints, *Fourteenth Symposium on Boundary Layers and Turbulence*, Aspen, CO, American Meteorological Society.

“Jensen’s inequality and systematic biases in numerical simulations of the atmosphere.” V. E. Larson, R. Wood, P. R. Field, J.-C. Golaz, T. H. Vonder Haar, and W. R. Cotton, 2000. Preprints, *International Conference on Scientific Computing and Mathematical Modeling*, Milwaukee, WI, International Association for Mathematics and Computers in Simulation.

“An observational study of the microphysics of altostratus clouds.” V. E. Larson, R. P. Fleishauer, J. A. Kankiewicz, D. L. Reinke, and T. H. Vonder Haar, 2000. Preprints, *Battlespace Atmospheric and Cloud Impacts on Military Operations Conference 2000*, Fort Collins, CO, Army Research Laboratory.

“Complex layered cloud experiment (CLEX-5): Preliminary phenomenology of four case studies.” R. P. Fleishauer, V. E. Larson, J. A. Kankiewicz, D. L. Reinke, and T. H. Vonder Haar, 2000. Preprints, *Battlespace Atmospheric and Cloud Impacts on Military Operations Conference 2000*, Fort Collins, CO, Army Research Laboratory.

“The Relationship Between the Transilient Matrix and the Green’s Function for the Advection-Diffusion Equation.” V. E. Larson, 1998. Preprints, *Conference on Cloud Physics*, Everett, WA, Amer. Meteor. Soc., 538–541.