Curriculum Vitae (May 14, 2012)

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## Education

Ph. D., Massachusetts Institute of Technology, Mathematics, September 1984
Thesis Title: *A Mathematical Model of Moist Convection*
B. S., California Institute of Technology, Applied Mathematics, June 1980

## Professional Experience

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| 1996-present | Professor of Atmospheric Science and Applied Mathematics, University of Washington. |
| 2006-2011 | Director, University of Washington Program for Climate Change |
| 2007-2008 | Gastprofessor, Institute for Atmosphere and Climate, ETH-Zürich |
| 2002-2005 | Affiliate Scientist, Climate and Global Dynamics Division National Center for Atmospheric Research |
| 2000-2001 | Visiting Scientist, Climate and Global Dynamics Division National Center for Atmospheric Research |
| 1989-1996 | Associate Professor of Atmospheric Science and Applied Mathematics, University of Washington. |
| 1992, 1994 | Scientific consultant, European Center for Medium Range Weather Forecasting, Reading, England |
| 1993 | Visiting Scientist, Mesoscale and Microscale Meteorology Division, National Center for Atmospheric Research |
| 1992 | Houghton Visiting Professor, Department of Earth, Atmospheric Planetary Sciences, Massachusetts Institute of Technology. |
| 1988-1989 | Assistant Professor of Applied Mathematics and |

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| | Atmospheric Science, University of Washington. |
| 1985-1988 | Assistant Professor of Applied Mathematics, University of Washington. |
| 1984-1985 | Postdoctoral Fellow, Advanced Study Program, National Center Atmospheric Research. |

Professional Duties and Societies

Editor, *Journal of the Atmospheric Sciences*, 1/95-12/99.

Member and Fellow, American Meteorological Society. Have served on AMS Committees on Waves and Stability (1989-1991, 1996-1998, as chair and conference chair 1997-8), Mesoscale Meteorology conference co-chair in 1992, Haurwitz Prize Selection Committee, 1993-1994, Fellows Selection Committee 2006-2009 and on the program committee of the AMS-sponsored Second International Air-Sea Interaction Conference, Lisbon, September 1994.

National/International Committees and Science Teams (only current activities listed)

IPCC WG1 Fifth Assessment Lead Author, 5/10-present

Boundary Layer Cloud Working Group, GCSS (GEWEX Cloud Systems Study), 7/93-present.

VOCALS (VAMOS Ocean Cloud Atmosphere Land Study) Scientific Working Group 1/01-present, chair 1/01-3/04, co-chair 3/04-present.

NCAR Institute for Mathematical Applied to Geosciences (IMAGe) Scientific Advisory Committee, 6/06-present.

Honors and Fellowships

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|---|---|
| Fellow, Mesoscale Meteorology Summer Program | |
| National Center for Atmospheric Research | 1984 |
| Postdoctoral Fellow, Advanced Study Program | |
| National Center for Atmospheric Research | 1984-1985 |
| National Science Foundation Presidential Young Investigator in Atmospheric Science | 1988-1994 |
| American Meteorological Society Editor's Award | |
| UW Department of Atmospheric Sciences Annual Teaching Award | 2001-2002 |
| Elected Fellow of the American Meteorological Society | Jan. 2004 |
| American Meteorological Society Jule G. Charney Award | Jan. 2012 |

Refereed Papers and Book/Monograph Chapters

Bretherton, C. S., 1983: Intermittency through modulational instability. *Phys. Lett.* **96A**, 152-156.

Bretherton, C. S., and A. O. Steinhardt, 1983: Some new results on Butterworth filters. *IEEE Trans. Acoustics, Speech, Signal Proc.*, **31**, 1576-1577.

Bretherton, C. S., 1987: A theory for nonprecipitating moist convection between two parallel plates. Part I: Thermodynamics and 'linear' solutions. *J. Atmos. Sci.*, **44**, 1809-1827.

Bretherton, C. S., 1987: A note on linear propagating nonprecipitating convection. *J. Atmos. Sci.*, **44**, 1869-1874.

Pfeffer, W. T., and C. S. Bretherton, 1987: The effect of crevasses on the solar heating of a glacier surface. *The Physical Basis of Icesheet Modelling* (Proceedings of the Vancouver Symposium, August, 1987) IAHS Publication 170, 191-205.

Bretherton, C. S., 1987: Analytical solutions to Emanuel's model of precipitating convection. *J. Atmos. Sci.*, **44**, 3355-3362.

Levy, G. , and C. S. Bretherton, 1987: Comments on a theory of the evolution of an observed cold front. *J. Atmos. Sci.*, **44**, 3413-3418.

Bretherton, C. S., 1988: Group velocity and the linear response of stratified fluids to internal heat or mass sources. *J. Atmos. Sci.*, **45**, 81-93.

Bretherton, C. S., 1988: A mathematical model of nonprecipitating convection between two parallel plates. Part II: nonlinear theory and cloud organization. *J. Atmos. Sci.*, **45**, 2391-2415.

Bretherton, C. S., and P. K. Smolarkiewicz, 1989: Gravity waves, compensating subsidence and detrainment around cumulus clouds. *J. Atmos. Sci.*, **46**, 740-759.

Siems, S. T., C. S. Bretherton, M. B. Baker, S. Shy and R. T. Breidenthal, 1990: Buoyancy reversal and cloudtop entrainment instability. *Quart. J. Roy. Meteor. Soc.*, **116**, 705-739.

Bretherton, C. S., 1991: Modelling the Lagrangian evolution of cloud-topped boundary layers. In *Physical Processes in Atmospheric Models*, D. R. Sikka and S. S. Singh, eds., 97-119 (book chapter, not peer reviewed)

Bretherton, C. S., C. Smith, and J. M. Wallace, 1992: An intercomparison of methods for finding coupled patterns in climate data. *J. Climate*, **5**, 541-560.

Wallace, J. M., C. Smith and C. S. Bretherton, 1992: Singular value decomposition of wintertime sea surface temperature and 500 mb height anomalies. *J. Climate*, **5**, 561-576.

Siems, S. T., and C. S. Bretherton, 1992: A numerical investigation of cloud-top entrainment instability and related experiments. *Quart. J. Roy. Meteor. Soc.*, **118**, 787-818.

Rand, H. A., and C. S. Bretherton, 1993: The relevance of the mesoscale entrainment instability to the marine cloud-topped atmospheric boundary layer. *J. Atmos. Sci.*, **50**, 1152-1158.

Bretherton, C. S., and C. Schär, 1993: Potential vorticity flux. A simple derivation and comments about uniqueness. *J. Atmos. Sci.*, **50**, 1834-1836.

Bretherton, C. S., 1993: Understanding Albrecht's model of trade-cumulus cloud fields. *J. Atmos. Sci.*, **50**, 2264-2283.

Siems, S. T., D. H. Lenschow, and C. S. Bretherton, 1993: A numerical study of the interaction between stratocumulus and the air overlying it. *J. Atmos. Sci.*, **50**, 3663-3676.

Pandya, R., D. Durran and C. S. Bretherton, 1993: Comments on 'Thermally forced gravity waves at rest'. *J. Atmos. Sci.*, **50**, 4097-4101.

Bretherton, C. S., 1993: The nature of adjustment in cumulus cloud fields. *Meteorological Monographs*, **24**, 63-74 (monograph chapter, peer-reviewed).

Emanuel, K. A., J. D. Neelin and C. S. Bretherton, 1994: On large-scale circulations in convecting atmospheres. *Quart. J. Roy. Meteor. Soc.*, **120**, 1111-1143.

Brown, R., and C. S. Bretherton, 1995: Tropical wave instabilities: Convective interaction with dynamics using the Emanuel cumulus parameterization. *J. Atmos. Sci.*, **52**, 67-82.

Albrecht, B. A., C. S. Bretherton, D. Johnson, W. Schubert and A. S. Frisch, 1995: The Atlantic Stratocumulus Transition Experiment (ASTEX), *Bull. Amer. Meteor. Soc.*, **76**, 889-903.

Bretherton, C. S., and R. Pincus, 1995: Cloudiness and marine boundary layer dynamics in the ASTEX Lagrangian experiments. Part I: Synoptic setting and vertical structure. *J. Atmos. Sci.*, **52**, 2707-2723.

Bretherton, C. S., Austin, P., and S. T. Siems, 1995: Cloudiness and marine boundary layer dynamics in the ASTEX Lagrangian experiments. Part II: Cloudiness, drizzle, surface fluxes and entrainment. *J. Atmos. Sci.*, **52**, 2724-2735.

Bretherton, C. S., E. Klinker, J. Coakley and A. K. Betts, 1995: Comparison of ceilometer, satellite and synoptic measurements of boundary layer cloudiness and the ECMWF diagnostic cloud parameterization scheme during ASTEX. *J. Atmos. Sci.*, **52**, 2736-2751.

Betts, A. K., C. S. Bretherton and E. Klinker, 1995: Relation between mean boundary layer structure and cloudiness at the R/V Valdivia during ASTEX. *J. Atmos. Sci.*, **52**, 2752-2762.

Emanuel, K., D. Raymond, A. Betts, L. Bosart, C. Bretherton, K. Droegemeier, B. Farrell, J. M. Fritsch, R. Houze, Jr., M. LeMone, D. Lilly, R. Rotunno, M. Shapiro, R. Smith and A. Thorpe, 1995: Report of the First Prospectus Development Team of the U. S. Weather Research Program to NOAA and the NSF. *Bull. Amer. Meteor. Soc.*, **76**, 1194-1208.

Noone, K. J., R. D. Schillawski, G. L. Kok, C. S. Bretherton and B. J. Huebert, 1996: Ozone in the marine atmosphere observed during the Atlantic Stratocumulus Transition Experiment/ Marine Aerosol and Gas Exchange. *J. Geophys. Res.*, **101**, 4485-4499.

Moeng, C.-H., W. R. Cotton, C. S. Bretherton, A. Chlond, M. Khairoutdinov, S. Krueger, W. S. Lewellen, M. K. MacVean, J. R. M. Pasquier, H. A. Rand, A. P. Siebesma, R. I. Sykes, and B. Stevens, 1996: Simulation of a stratocumulus-topped PBL: Intercomparison among different numerical codes. *Bull. Amer. Meteor. Soc.*, **77**, 261-278.

Grinnell, S. A., C. S. Bretherton, D. E. Stevens and A. M. Fraser, 1996: Vertical mass flux observations in Hawaiian trade cumulus clouds by Doppler radar. *J. Atmos. Sci.*, **53**, 1870-1886.

Stevens, D. E., and C. S. Bretherton, 1996: A new forward-in-time advection scheme and adaptive multilevel flow solver for nearly incompressible atmospheric flow. *J. Comp. Phys.*, **129**, 284- 295.

Bretherton, C. S., and M. C. Wyant, 1997: Moisture transport, lower tropospheric stability and decoupling of cloud-topped boundary layers. *J. Atmos. Sci.*, **54**, 148-167.

Wyant, M. C., C. S. Bretherton, H. A. Rand, and D. E. Stevens, 1997: Numerical simulations and a conceptual model of the stratocumulus to trade cumulus transition. *J. Atmos. Sci.*, **54**, 168-192.

Brown, R., and C. S. Bretherton, 1997: A test of the strict quasi-equilibrium theory on long time and space scales. *J. Atmos. Sci.*, **54**, 624-638.

Pincus, R., M. B. Baker, and C. S. Bretherton, 1997: What controls stratocumulus radiative properties? Lagrangian observations of cloud evolution. *J. Atmos. Sci.*, **54**, 2215-2236.

Bretherton, C. S., 1997: Convection in stratocumulus-capped atmospheric boundary layers. In *The Physics and Parameterization of Moist Atmospheric Convection*, R. K. Smith, ed., Kluwer Publishers, 127-142 (peer-reviewed book chapter).

Bretherton, C. S., 1997: Entrainment, detrainment, and mixing in atmospheric convection. In *The Physics and Parameterization of Moist Atmospheric Convection*, R. K. Smith, ed., Kluwer Publishers, 211-230 (peer-reviewed book chapter).

Bretherton, C. S., 1998: Comment on 'Wave-CISK of equatorial waves and the vertical distribution of cumulus heating. *J. Atmos. Sci.*, **55**, 1904-1905.

Bretherton, C. S. and H. Grenier, 1998: A new look at an old approach for parameterization of shallow moist convection. Proceedings of the GCSS-WGNE Workshop on Cloud Processes and Cloud Feedbacks in Large Scale Models, 11/98 (not peer-reviewed; to be published by ECMWF).

Bretherton, C. S., M. K. MacVean, and 14 coauthors, 1999: An intercomparison of radiatively-driven entrainment and turbulence in a smoke cloud, as simulated by different numerical models. *Quart. J. Roy. Meteor. Soc.*, **125**, 391-423.

Stevens, D. E., and C. S. Bretherton, 1999: Effects of grid resolution on large-eddy simulation of radiatively-driven entrainment through a strong inversion. *Quart. J. R. Meteor. Soc.*, **125**, 425- 439.

Sobel, A. H., and C. S. Bretherton, 1999: Development of synoptic-scale disturbances over the summertime tropical northwest Pacific. *J. Atmos. Sci.*, **56**, 3106-3217.

Su, H., S. S. Chen, and C. S. Bretherton, 1999: Three-dimensional week-long simulations of TOGA-COARE convective systems using the MM5 mesoscale model. *J. Atmos. Sci.*, **56**, 2326-2344.

Bretherton, C. S., M. Widmann, V. P. Dymnikov, J. M. Wallace, and I. Blade, 1999: The effective number of spatial degrees of freedom of a time-varying field. *J. Climate*, **12**, 1990-2009.

Bretherton, C. S., S. K. Krueger, M. C. Wyant, P. Bechtold, E. van Meijgaard, B. Stevens, and J. Teixeira, 1999: A GCSS boundary layer model intercomparison study of the first ASTEX Lagrangian experiment. *Bound.-Layer Meteor.*, **93**, 341-380.

Bretherton, C. S., and D. S. Battisti, 2000:. An interpretation of the results from atmospheric general circulation models forced by the time history of the observed sea surface temperature distribution. *Geophys. Res. Lett.*, **27**, 767-770.

Su, H., C. S. Bretherton, and S. S. Chen, 2000: Self-aggregation and large-scale control of tropical deep convection: A modeling study. *J. Atmos. Sci.*, **57**, 1787-1816.

Moskowitz, B. M., and C. S. Bretherton, 2000: An analysis of frictional feedback in the Madden-Julian Oscillation. *J. Atmos. Sci.*, **57**, 2188-2206.

Widmann, M., and C. S. Bretherton, 2000: Validation of mesoscale precipitation in the NCEP re-analysis using a new gridpoint dataset for the northwestern US. *J. Climate*, **13**, 1936-1950.

Beesley, T. A., C. S. Bretherton, C. Jakob, E. L Andreas, J. M. Intrieri, and T. A. Uttal, 2000: A comparison of the ECMWF forecast model with observations at SHEBA, *J. Geophys. Res.*, **105**, 12337-12349.

Coakley, J.A., P.A. Durkee, K. Nielsen, J.P. Taylor, S. Platnick, B.A. Albrecht, D. Babb, F-L. Chang, W.R. Tahnk, C.S. Bretherton, and P.V. Hobbs, 2000: The appearance and disappearance of ship tracks on large spatial scales. *J. Atmos. Sci.*, **57**, 2765-2778.

Sobel, A. H., and C. S. Bretherton, 2000: Modeling tropical precipitation in a single column. *J. Climate*, **13**, 4378-4392.

Grenier, H. and C. S. Bretherton, 2001: A moist PBL parameterization for large-scale models and its application to subtropical cloud-topped marine boundary layers. *Mon. Wea. Rev.*, **129**, 357-377.

Carr, M. T., and C. S. Bretherton, 2001 Budget calculations of convective momentum transport over the tropical Pacific. *J. Atmos. Sci.*, **58**, 1673-1693.

Sobel, A. H., I. M. Held, and C. S. Bretherton, 2002: The ENSO signal in tropical tropospheric temperature. *J. Climat*e, **15**, 2702-2706.

Bretherton, C. S., and A. H. Sobel, 2002: A simple model of a convectively-coupled Walker circulation using the weak temperature gradient approximation. *J. Climate*, **15**, 2907-2920.

Wood, R., C. S. Bretherton, and D. L. Hartmann, 2002: Diurnal cycle of liquid water path over the subtropical and tropical oceans. *Geophys. Res. Lett.*, **29**(23),,2092, doi:10.1029/2002GL015371.

Cullen, A. C., and C. S. Bretherton, 2002: Progressing toward environmental sustainability. In *Making Progress: Essays in Progress and Public Policy*, J. Looney and C. L. Anderson, Eds., Lexington Books, 379-407.

Stevens, D. E., A. S. Ackerman, and C. S. Bretherton, 2002: Effects of domain size and numerical resolution on the simulation of shallow cumulus convection. *J. Atmos. Sci.*, **59**, 3285-3301.

Bretherton, C. S., 2003: Data analysis: Empirical orthogonal functions, singular vectors, time series analysis. *Enclopedia of Atmospheric Sciences*, Eds. J. R. Holton, J. Pyle, J. A. Curry, Academic Press, pp. 617-620.

Bretherton, C. S., 2003: Wave-CISK. *Enclopedia of Atmospheric Sciences*, Eds. J. R. Holton, J. Pyle, J. A. Curry, Academic Press, pp. 1019-1022

Bretherton, C. S., and A. H. Sobel, 2003: The Gill model and the Weak Temperature Gradient approximation. *J. Atmos. Sci.*, **60**, 451-460.

Sobel, A. H., and C. S. Bretherton, 2003: Large-scale waves interacting with deep convection in idealized mesoscale model simulations. *Tellus*, **55A**, 45-60.

Widmann, M., C. S. Bretherton, and E. P. Salathe, 2003: Statistical precipitation downscaling over the Northwestern United States using numerically simulated precipitation as a predictor. *J. Climate*, **16**, 799-816.

Zhang, M., W. Lin, C. S. Bretherton, J. J. Hack, and P. J. Rasch, 2003: A modified formulation of fractional stratiform condensation rate in the Community Atmosphere Model CAM2. *J. Geophys. Res.*, **108(D1)**, 4035, doi:10.1029/2002JD002523.

Randall, D. A., and 11 coauthors, 2003: Confronting models with data. The GEWEX Cloud Systems Study. *Bull. Amer. Meteor. Soc.*, **84**, 455-469.

Siebesma, A. P., C. S. Bretherton, and 11 coauthors, 2003: A large-eddy simulation intercomparison study of shallow cumulus convection. *J. Atmos. Sci.*, **60**, 1201-1219.

Stevens, B., and 31 coauthors, 2003: Dynamics and Chemistry of Marine Stratocumulus -- DYCOMS-II. *Bull. Amer. Meteor. Soc.*, **84**, 579-593.

Raymond, D. J., G. Raga, C. S. Bretherton, S. DeSzoeke, J. Molinari, C. Lopez-Carillo, and Zeljka Fuchs, 2003: Convective forcing in the intertropical convergence zone of the East Pacific. *J. Atmos. Sci.*, **60**, 2064-2082.

Boville, B. O., and C. S. Bretherton, 2003: Heating and dissipation in the NCAR Community Atmosphere Model. *J. Climate*, **16**, 3877-3887.

Sobel, A. H., S. E. Yuter, C. S. Bretherton, and G.N. Kiladis, 2004: Large-scale meteorology and deep convection during TRMM KWAJEX. *Mon. Wea. Rev.*, **132**, 422-444.

Bretherton, C. S., J. R. McCaa, and H. Grenier, 2004: A new parameterization for shallow cumulus convection and its application to marine subtropical cloud-topped boundary layers. Part I: Description and 1-D results. *Mon. Wea. Rev.*, **132**, 864-882.

McCaa, J. R., and C. S. Bretherton, 2004: A new parameterization for shallow cumulus convection and its application to marine subtropical cloud-topped boundary layers. Part II: Regional simulations of marine boundary layer clouds. *Mon. Wea. Rev.*, **132**, 883-896.

Bretherton, C. S., M. E. Peters, and L. E. Back, 2004: Relationships between water vapor path and precipitation over the tropical oceans. *J. Climate*, 17, 1517-1528.

Bretherton, C. S., R. Ferrari, and S. Legg, 2004: Climate Process Teams: A new approach to improving climate models. *U.S. CLIVAR Variations*, Vol. 2, No. 1, 1-6.

DeSzoeke, S. P. , and C. S. Bretherton, 2004: Quasi-Lagrangian large eddy simulations of cross-equatorial flow in the east Pacific atmospheric boundary layer. *J. Atmos. Sci.*, **61**, 1837-1858.

Bretherton, C. S., T. Uttal, C. W. Fairall, S. Yuter, R. Weller, D. Baumgardner, K. Comstock, and R. Wood, 2004: The EPIC 2001 stratocumulus study. *Bull. Amer. Meteor. Soc.*, **85**, 967-977.

Wood, R., and C. S. Bretherton, 2004: Boundary layer depth, entrainment and decoupling in the cloud-capped subtropical and tropical marine boundary layer. *J. Climate*, **17**, 3575-3587.

Raymond, D. J., and coauthors, 2004: EPIC2001 and the coupled ocean-atmosphere system of the tropical East Pacific. *Bull. Amer. Meteor. Soc.*, **85**, 1341-1354.

Durran, D. R., and C. S. Bretherton, 2004: Comments on "The Roles of the Horizontal Component of the Earth's Angular Velocity in Nonhydrostatic Linear Models". *J. Atmos. Sci.*, **61**, 1982-1986.

Zhu, P., and C. S. Bretherton, 2004: A simulation study of shallow moist convection and its impact on the atmospheric boundary layer. *Mon. Wea. Rev.*, 132, 2391-2409.

Kuang, Z., and C. S. Bretherton, 2004: Convective influence of the heat balance of the tropical tropopause layer: A cloud-resolving model study. *J. Atmos. Sci.*, **23**, 2919–2927.

Sobel, A. H., C. S. Bretherton, H. Gildor and M. Peters, 2004: Convection, cloud-radiative feedbacks and thermodynamic ocean coupling in simple models of the Walker circulation. *Ocean- atmosphere interaction and climate variability*, Chunzai Wang, Shang-Ping Xie, and Jim Carton, Eds. Amer. Geophys. Union Geophysical Monograph 147, 393-405.

Comstock, K. K., R. Wood, S. E. Yuter, and C. S. Bretherton, 2004: Reflectivity and rain rate in and below drizzling stratocumulus. *Quart. J. Roy. Meteorol. Soc.*, **130**, 2891-2918.

Kuang, Z., P. N. Blossey, and C. S. Bretherton, 2005: A DARE approach for 3D cloud resolving simulations of large scale atmospheric circulation. *Geophys. Res. Lett.*, **32**, L02809, doi: 10.1029/2004GL021024.

Stevens, B., G. Vali, K. Comstock, R. Wood, M. C. van Zanten, P. H. Austin, C. S. Bretherton, and D. H. Lenschow, 2005: Pockets of open cells (POCs) and drizzle in marine stratocumulus. *Bull. Amer. Meteor. Soc.*, **86**, 51–57.

DeSzoeke, S. P., C. S. Bretherton, N. A. Bond, M. F. Cronin, and B. M. Morley, 2005: EPIC 95W observations of the eastern Pacific atmospheric boundary layer from the cold tongue to the ITCZ. *J. Atmos. Sci.*, **62**, 426-442.

Quadrelli, R., C. S. Bretherton, and J. M. Wallace, 2005: On sampling errors in empirical orthogonal functions. *J. Climate*, **18**, 3704-3710.

Stevens, B., and coauthors, 2005: Evaluation of large-eddy simulations via observations of nocturnal marine stratocumulus. *Mon. Wea. Rev.*, **133**, 1443-1462.

Zhu, P., and coauthors, 2005: Intercomparison and interpretation of single column model simulations of a nocturnal stratocumulus topped marine boundary layer. *Mon. Wea. Rev.*, **133**, 2741-2758.

Caldwell, P., C. S. Bretherton, and R. Wood, 2005: Mixed-layer budget analysis of the diurnal cycle of entrainment in SE Pacific stratocumulus. *J. Atmos. Sci.*, **62**, 3775-3791.

Comstock, K. K., C. S. Bretherton, and S. E. Yuter, 2005: Mesoscale variability and drizzle in southeast Pacific stratocumulus. *J. Atmos. Sci.*, **62**, 3792-3807.

Back, L. E., and C. S. Bretherton, 2005: The relationship between wind speed and precipitation in the Pacific ITCZ. *J. Climate*, **18**, 4317-4328.

Peters, M. E., and C. S. Bretherton, 2005: A simplified model of the Walker circulation with an interactive ocean mixed layer and cloud-radiative feedbacks. *J. Climate*, **18**, 4216-4234.

Bretherton, C. S., P. N. Blossey, and M. Khairoutdinov, 2005: An energy-balance analysis of deep convective self-aggregation above uniform SST. *J. Atmos. Sci.*, **62**, 4273-4292.

De Szoeke, S. P., and C. S. Bretherton, 2005: Variability in the southerly flow into the eastern Pacific ITCZ. *J. Atmos. Sci.*, **62,** 4400-4411.

Cornish, C. R., C. S. Bretherton, and D. B. Percival, 2006: Wavelet analysis of marine boundary layer turbulence during EPIC. *Bound.-Layer Meteor.*, doi:10.1007/s10546-005-9011-y.

Raymond, D. J., C. S. Bretherton, and J. Molinari, 2006: Dynamics of the intertropical convergence zone of the east Pacific. *J. Atmos. Sci.*, **63**, 582–597.

Bretherton, C. S., 2006: The Climate Process Team on Low-Latitude Cloud Feedbacks on Climate Sensitivity. U.S. CLIVAR *Variations*, **4**, No. 1, 7-12.

Wyant, M. C., M. Khairoutdinov, and C. S. Bretherton, 2006: Climate sensitivity and cloud response of a GCM with a superparameterization, *Geophys. Res. Lett.*, **33**, L06714, doi:10.1029/2005GL025464.

Wyant, M. E., C. S. Bretherton, J. T. Bacmeister, J. T. Kiehl, I. M. Held, M. Zhao, S. A. Klein, and B. A. Soden, 2006: A comparison of tropical cloud properties and responses in GCMs using mid-tropospheric vertical velocity. *Climate Dyn.*, **27**, 261-279.

Collins, W. D., and coauthors, 2006: The Community Climate System Model: CCSM3. *J. Climate*, **19**, 2122-2143.

Kuang, Z., and C. S. Bretherton, 2006: A mass flux scheme view of a high-resolution simulation of transition from shallow to deep cumulus convection. *J. Atmos. Sci.*, **63**, 1895-1909.

Bony, S., and coauthors, 2006: How well do we understand climate change feedback processes? *J. Climate*, **19**, 3445-3482.

Bretherton, C. S., P. N. Blossey, and M. E. Peters, 2006: Comparison of simple and cloud-resolving models of moist convection-radiation interaction with a mock-Walker circulation. *Theor. Comp. Fluid. Dyn.*, doi:10.1007/s00162-006-0029-7.

Peters, M. E., and C. S. Bretherton, 2006: Structure of tropical variability from a vertical mode perspective. *Theor. Comp. Fluid. Dyn.*, doi:10.1007/s00162-006-0034-x.

Back, L. E, and C. S. Bretherton, 2006: Geographic variability in the export of moist static energy and vertical motion profiles in the Tropical Pacific. *Geophys. Res. Lett.*, **33**, L17810, doi:10.1029/2006GL026672.

Wood, R., and C. S. Bretherton, 2006: On the relationship between stratiform low cloud cover and lower tropospheric stability. *J. Climate.*, **19**, 6425-6432. .

Bretherton, C. S., P. N. Blossey, and J. Uchida, 2007: Cloud droplet sedimentation, entrainment efficiency, and subtropical stratocumulus albedo. *Geophys. Res. Lett.*, 34, L03813, doi:10.1029/2006GL027648.

Blossey, P. N., C. S. Bretherton, J. Cetrone, and M. Khairoutdinov, 2007: Cloud-resolving model simulations of KWAJEX: Model sensitivities and comparisons with satellite and radar observations. *J. Atmos. Sci.*, **64**, 1488-1508.

Bretherton, C. S., 2007: Challenges in Numerical Modeling of Tropical Circulations. In *General Circulation of the Atmosphere*, A. H. Sobel and T. Schneider, Eds., pp. 302-330.

Zhu, P., J. T. Kiehl, J. J. Hack, and C. S. Bretherton, 2007: Climate sensitivity of tropical and subtropical marine low cloud amount to ENSO and global warming due to doubled CO2. *J. Geophys. Res.*, **112**, D17108, doi:10.1029/2006JD008174.

Comstock, K. K., S. E. Yuter, R. Wood, and C. S. Bretherton, 2007: The three-dimensional structure and kinematics of drizzling stratocumulus. *Mon. Wea. Rev.*, **135**, 3767-3784.

Wyant, M., and coauthors, 2007: A single column model intercomparison of a heavily drizzling stratocumulus topped boundary layer. *J. Geophys. Res.*, **112**, D24204, doi:10.1029/2007JD008536.

Teixeira, J., and coauthors, 2008: Parameterization of the atmospheric boundary layer: A view from just above the inversion. *Bull. Amer. Meteor. Soc.*, **89**, 453-458.

Bretherton, C. S., and S. Park, 2008: A new bulk shallow cumulus-topped boundary layer model. *J. Atmos. Sci.*, **65**, 2174-2193.

Wood, R., K. K. Comstock, C. S. Bretherton, C. Cornish, J. Tomlinson, D. R. Collins, and C. Fairall, 2008: Open cellular structure in marine stratocumulus cloud sheets. *J. Geophys. Res.*, **113**, D12207, doi:10.1029/2007JD009371.

Zhang, M., and C. S. Bretherton, 2008: Mechanisms of low cloud climate feedback in idealized single-column simulations with the Community Atmospheric Model (CAM3). *J. Climate*, **21**, 4859-4878.

Medeiros, B. P., B. Stevens, Held, I. M., M. Zhao, D. L. Williamson, J. G. Olson, and C. S. Bretherton, 2008: Aquaplanets, climate sensitivity and low clouds. *J. Climate*, **21**, 4974-4991.

Petch, J. C., P. N. Blossey, and C. S. Bretherton, 2008: Differences in the lower troposphere in two- and three-dimensional cloud-resolving model simulations of deep convection. *Quart. J. Roy. Meteor. Soc.*, **636**, 1941-1946.

Caldwell, P., and C. S. Bretherton, 2009: Response of a subtropical stratocumulus-capped mixed layer to climate and aerosol changes. *J. Climate*, **22**, 20-38.

Bretherton, C. S., and D. L. Hartmann, 2009: *Large-scale controls on cloudiness. Peer-reviewed book chapter for Perturbed Clouds in the Climate System: Their Relationship to Energy Balance, Atmospheric Dynamics and Precipitation*, eds. J. Heintzenberg and R. J. Charlson. Strungmann Forum Reports, vol. 2, MIT Press. 217-234.

Siebesma, A. P., J.-L. Brenguier, C. S. Bretherton, W. W. Grabowski, J. Heintzenberg, B. Kaercher, K. Lehmann, J. C. Petch, P. Spichtinger, B. Stevens and F. Stratmann, 2009: Cloud-controlling factors. Peer-reviewed book chapter for *Perturbed Clouds in the Climate System: Their Relationship to Energy Balance, Atmospheric Dynamics and Precipitation*, eds. J. Heintzenberg and R. J. Charlson. Strungmann Forum Reports, vol. 2, MIT Press. 269-290.

Caldwell, P., and C. S. Bretherton, 2009: Large eddy simulation of the diurnal cycle in Southeast Pacific stratocumulus. *J. Atmos. Sci.*, **66,** 432-449.

Ackerman, A. S., and coauthors, 2009: Large-eddy simulations of a drizzling, stratocumulus-topped marine boundary layer. *Mon Wea. Rev.*, **137**, 1083-1110.

Lopez, M. A., D. L. Hartmann, P. N. Blossey, R. Wood, C. S. Bretherton, and T. L. Kubar, 2009: A test of the simulation of tropical convective cloudiness by a cloud-resolving model. *J. Climate*, **22**, 2834-2849.

Hannay, C., D. L Williamson, J. J Hack, J. T. Kiehl, J. G. Olson, S. A. Klein, C. S. Bretherton, and M. Köhler, 2009: Evaluation of forecasted Southeast Pacific stratocumulus in the NCAR, GFDL and ECMWF models. *J. Climate*, **22**, 2871-2889.

Bretherton, C. S., and S. Park, 2009: A new moist turbulence parameterization in the Community Atmosphere Model. *J. Climate*, **22**, 3422-3448.

Park, S. and C. S. Bretherton, 2009: The University of Washington shallow convection and moist turbulence schemes and their impact on climate simulations with the Community Atmosphere Model. *J. Climate*, **22**, 3449-3469.

Back, L. E, and C. S. Bretherton, 2009: On the relationship between SST gradients, boundary layer winds and convergence over the tropical oceans. *J. Climate*, 22, 4182-4196.

Wyant, M. C., C. S. Bretherton, and P. N. Blossey, 2009: Understanding subtropical low cloud response to a warmer climate in a superparameterized climate model. Part I: Regime sorting and physical mechanisms. *Journal of Advancing Modeling Earth Systems* , 1, Art. #7, 11 pp., doi:10.3894/JAMES.2009.1.7.

Blossey, P. N., C. S. Bretherton, and M. C. Wyant, 2009: Understanding subtropical low cloud response to a warmer climate in a superparameterized climate model. Part II: Column modeling with a cloud-resolving model. *Journal of Advancing Modeling Earth Systems*, 1, Art. #8, 14 pp., doi:10.3894/JAMES.2009.1.8.

Hohenegger, C., P. Brockhaus, C. S. Bretherton and C. Schar, 2009: The soil moisture-precipitation feedback in simulations with explicit and parameterized convection. *J. Climate*, **22**, 5003-5020.

Back, L. E, and C. S. Bretherton, 2009: A simple model of climatological precipitation and vertical motion patterns over the tropical oceans. *J. Climate*, **22**, 6477-6497.

Fletcher, J. K., and C. S. Bretherton, 2010: Evaluating boundary-layer based mass flux closures using cloud-resolving model simulations of deep convection. *J. Atmos. Sci.*, **67**, 2212-2225.

Uchida, J., C. S, Bretherton, and P. N. Blossey, 2010: The sensitivity of stratocumulus-capped mixed layers to cloud droplet concentration: Do LES and mixed-layer models agree? *Atmos. Chem. Phys.*, **10**, 4097-4109.

Wyant, M. C., and coauthors, 2010: The PreVOCA Experiment: Modeling the lower troposphere in the Southeast Pacific. *Atmos. Chem. Phys.*, **10**, 4757-4774.

Bretherton, C. S., R. Wood, R. C. George., D. Leon, G. Allen, and X. Zheng, 2010: Southeast Pacific stratocumulus clouds, precipitation and boundary layer structure sampled along 20 S during VOCALS-REx. *Atmos. Chem. Phys.*, **10**, 10639-10654**.**

Bretherton, C. S, J. Uchida, and P. N. Blossey, 2010: Slow manifolds and multiple equilibria in stratocumulus-capped boundary layers. *Journal of Advancing Modeling Earth Systems*, **2**, Art.#14, 20 pp.

Wood, R., C. S. Bretherton, Mechoso, C. R., and coauthors, 2011: The VAMOS Ocean-Cloud-Atmosphere-Land Study Regional Experiment (VOCALS-REx): goals, platforms, and field operations. *Atmos. Chem. Phys.*, **11**, 627-654.

Wood, R., C. S. Bretherton, D. Leon, A. D. Clarke, P. Zuidema, G. Allen, and H. Coe, 2011: An aircraft case study of the spatial transition from closed to open mesoscale cellular convection over the Southeast Pacific. *Atmos. Chem. Phys.*, **11**, 2341-2370.

Allen, G., H. Coe, A. Clarke, and coauthors, 2011: Southeast Pacific atmospheric composition and variability sampled along 20 S during VOCALS-REx. *Atmos. Chem. Phys.*, **11**, 5237-5262.

Hohenegger, C., and C. S. Bretherton, 2011: Simulating deep convection with a shallow convection scheme. *Atmos. Chem. Phys.*, **11**, 10389-10406.

Jones, C. R., C. S. Bretherton, and D. Leon, 2011: Coupled vs. decoupled boundary layers in VOCALS-REx. *Atmos. Chem. Phys.*, **11**, 7143-7153.

Berner, A. H., C. S. Bretherton, and R. Wood, 2011: Large-eddy simulation of mesoscale dynamics and entrainment around a pocket of open cells observed in VOCALS RF06. *Atmos. Chem. Phys.*, **11**, 10525-10540.

Liu, X., and coauthors, 2011: Toward a minimal representation of aerosol direct and indirect effects: Model description and evaluation. *Geosci. Model. Dev. Discuss.*, **4**, 3485-3598.

Wyant, M. C., C. S. Bretherton, P. N. Blossey, and M. Khairoutdinov, 2012: Fast cloud adjustment to increasing CO2 in a superparameterized climate model. *J. Adv. Model Earth Syst.*, doi:10.1029/2011MS000092.

Caldwell, P., J. R. Norris, C. R. Jones, R. Wood, S. A. Klein and C. S. Bretherton, 2012: How often is the stratocumulus-topped boundary layer well-mixed? An observational perspective. *Geophys. Res. Lett.*, submitted 4/12.