

## **JULIO T. BACMEISTER**

Climate and Global Dynamics Division  
National Center for Atmospheric Research  
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### **Professional Preparation**

Swarthmore College Honors Program in Physics B.A., 1982  
Princeton University Program in Geophysical Fluid Dynamics Ph.D., 1987  
NASA Goddard Space Flight Center National Research Council Fellow 1987-1989

### **Employment**

7/2009- Scientist III, Climate and Global Dynamics Division, National Center for Atmospheric Research, Boulder, CO  
2003-2009 Associate Research Scientist, NASA Global Modeling and Assimilation Office/GEST UMBC, Greenbelt MD.  
2000-2003 Associate Research Scientist, NASA Seasonal-to-Interannual Prediction Project/Goddard Earth Science and Technology Center, Univ. of Maryland, Baltimore County (GEST UMBC), Greenbelt MD.  
1998-2000 Researcher, NASA Seasonal-to-Interannual Prediction Project/Univ. Space Research Associates, Greenbelt MD.  
1992-1998 Research Physicist (GS-13) Middle Atmosphere Dynamics Group, Naval Research Laboratory, Washington, D.C. .  
1989-1992 Assistant Research Associate, Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore MD.  
1982-1987 Research Assistant, Princeton University, Princeton, NJ

### **Invited Talks**

Cloud Related Physics Parameterizations for the GEOS-5 AGCM, NASA/CMAI Meeting, New York NY, April 2006

Examining the relationship between Tropical precipitation and convergence in Atmospheric General Circulation Model simulations. *Invited talk in the NCAR/CGD Seminar Series*, Boulder CO, January 2007.

Assessing the Performance of the GEOS-5 Data Assimilation System Using High Resolution Satellite Data. Fourth Symposium on Future National Operational Environmental Satellites, AMS 88<sup>th</sup> Annual Meeting, New Orleans LA, January 2008.

Physics parameterizations in global atmospheric models. Physics Dept., Colloquium, University of Maryland Baltimore County, April 2008

Parameterizing convection in high-resolution global atmospheric models. AGU Fall Meeting, San Francisco CA, 17 December 2009

What should we try to learn from high-resolution simulations? International Space Science Institute Team Meeting on *Merging Space- and Ground-based Observational Constraints for Gravity Wave Parameterizations in Climate Models* Bern Switzerland, 22 February 2010

### **Honors/Awards**

NRL Alan J. Berman Research Publication Award for paper entitled An algorithm for forecasting mountain wave related turbulence in the stratosphere, March 1995

NASA/GSFC Code 913 Scientific Publication Award for paper entitled Wind-stress simulations and the equatorial momentum budget of an AGCM, January 2003

### **Thesis Committees**

Faculty Group Leader 2002-2004  
Seasonal-to-Interannual Prediction Group  
GEST/UMBC

Thesis Committee, UMBC Physics Dept., Ph. D. Candidate 2006-2009  
Samuel G. Trahan

Thesis Committee, UMBC Marine-Estuarine-Environmental 2007-2009  
Sciences Dept. Ph. D. Candidate: Nikisa Jordan

Thesis Committee, UMBC Physics Dept., Ph. D. Candidate 2007-2009  
Mengsteab Weldegaber

### **Other supervisory experience**

Faculty Group Leader 2002-2004  
Seasonal-to-Interannual Prediction Group  
GEST/UMBC

Supervised UMBC Junior Scientists *Scott Weaver, In-Sun Song* 2007-2009  
NASA GMAO model development

### **Participation in National and International Research Efforts**

NSF Climate Process Team to examine climate effects of tropical clouds. 2003-2006

VAMOS Ocean-Land-Cloud-Atmosphere Study (VOCALS) 2007-2009  
Invited participant. VOCALS is an international effort to examine dynamics and microphysics of Peruvian Stratus clouds with intensive observations and coordinated modeling studies.

ISSI International Team on Gravity Wave Parameterizations 2009-  
in Climate Models

**Proposal and Paper Reviews 2009-2010**

5 ASP Post-doctoral Fellowship Applications  
2 proposals for NASA precipitation science program  
1 paper for *Climate Dynamics*,  
2 papers for *Journal of Geophysical Research*

**Other Community Service**

**NCAR:** Participant/contributor: Water Cycle Retreat, Boulder CO 7-9 December 2009;  
Community Climate System Model (CCSM) Atmospheric Model Working Group  
(AMWG) Meeting, Boulder CO, 10-12 February 2010.

**Outside:** Member NASA GEOS-5 development team. Participant GEOS-5 Workshop 22-23 April 2010 Greenbelt MD.

## Publications

### Refereed Journal Articles Publications

1. Bacmeister, J. T., and R. T. Pierrehumbert, 1988: On high-drag states of nonlinear stratified flow over an obstacle. *J. Atmos. Sci.* , 45, 63-80.
2. Bacmeister, J. T., and M. R. Schoeberl, 1989: Breakdown of vertically propagating two-dimensional gravity waves forced by orography, *J. Atmos. Sci.* , 46, 2109-2134.
3. Bacmeister, J. T., M. R. Schoeberl, L. R. Lait, P. A. Newman, and B. Gary, 1990: ER-2 mountain wave encounter over Antarctica: Evidence for blocking. *Geophys. Res. Lett.* , 17, 81-84.
4. Bacmeister, J. T., M. R. Schoeberl, L. R. Lait, P. A. Newman, and B. Gary, 1990: Small-scale waves encountered during AASE. *Geophys. Res. Lett.* , 17, 349-352.
5. Bacmeister, J. T., M. R. Schoeberl, M. Loewenstein, J. R. Podolske, S. E. Strahan, and K. R. Chan, 1992: An estimate of the relative magnitude of small-scale tracer fluxes. *Geophys. Res. Lett.* , 19, 1101-1104.
6. Bacmeister, J. T., 1993: Mountain-wave drag in the stratosphere and mesosphere inferred from observed winds and a simple mountain-wave parameterization scheme. *J. Atmos. Sci.* , 50, 377-399.
7. Bacmeister, J. T., P. A. Newman, B. L. Gary, and K. R. Chan, 1994: An algorithm for forecasting mountain wave related turbulence in the stratosphere. *Weather and Forecasting* , 9, 241-253.
8. Bacmeister, J. T., M. R. Schoeberl, M. E. Summers, J. R. Rosenfield, and Xun Zhu, 1995: Descent of long-lived trace gases in the winter polar vortex. *J. Geophys. Res.*, 100, 11669-11684.
9. Bacmeister, J. T., S. D. Eckermann, P. A. Newman, L. R. Lait, K. R. Chan, M. Loewenstein, M. H. Proffitt and Bruce L. Gary, 1996: Stratospheric Horizontal Wavenumber Spectra of Winds, Potential Temperature and Atmospheric Tracers Observed by High-Altitude Aircraft. *J. Geophys. Res.* , 101, 9441-9471.
10. Aellig, C. P. , J. T. Bacmeister, R. M. Bevilacqua, M. Daehler, D. Kriebel, T. Pauls, D. Siskind, N. Kaempfer, J. Langen, G. Hartmann, A. Berg, J. H. Park, and J. M. Russell, 1996: Space-borne H<sub>2</sub>O observations in the Arctic stratosphere and mesosphere in the spring of 1992 *Geophys. Res. Lett.*, 23, 2325-2328.
11. Tabazadeh, A., O. B. Toon, B. L. Gary, J. T. Bacmeister, and M. R. Schoeberl, 1996: Observational constraints on the formation of type 1a polar stratospheric clouds. *Geophys. Res. Lett.*, 23, 2109-2112.

12. Summers, M. E., D. E. Siskind, J. T. Bacmeister, R. R. Conway, S. E. Zazadil, and D. F. Strobel, 1997: The seasonal variation of middle atmosphere CH<sub>4</sub> and H<sub>2</sub>O with a new chemical dynamical model, *J. Geophys. Res.*, 102, 3503-3526.
13. Siskind, D. E., J. T. Bacmeister, M. E. Summers, S. E. Zazadil, and J. M. Russell, 1997: Two dimensional model calculations of nitric oxide transport in the middle atmosphere and comparison with HALOE data, *J. Geophys. Res.*, 102, 3527-3546.
14. Rosenfield, J. R., D. B. Considine, P. E. Meade, J. T. Bacmeister, C. H. Jackman, and M. R. Schoeberl, Stratospheric effects of the Mt. Pinatubo aerosol studied with a coupled two-dimensional model, *J. Geophys. Res.* 102, 3649-3670, 1997.
15. Bacmeister, J. T., D. E. Siskind, M. E. Summers, and S. D. Eckermann, 1998: Age-of-air in a zonally averaged model of the atmosphere, *J. Geophys. Res.* 103, 11,263-11,288.
16. Carslaw, K.S., M. Wirth, A. Tsias, B. P. Luo, A. Doernbrack, M. Leutbecher, H. Volkert, W. Renger, J. T. Bacmeister, and Th. Peter, 1998: Particle microphysics and chemistry in remotely observed mountain polar stratospheric clouds, *J. Geophys. Res.*, 103, 5785-5796.
17. Carslaw, K.S., M. Wirth, A. Tsias, B. P. Luo, A. Doernbrack, M. Leutbecher, H. Volkert, W. Renger, J. T. Bacmeister, E. Reimer, and Th. Peter, 1998: Influence of mesoscale mountain waves on stratospheric ozone depletion, *Nature*, 391, 675-678.
18. Siskind, D. E., J. T. Bacmeister, and M. E. Summers, 1998: A new calculation of chemical eddy transport for several middle atmospheric tracers, *J. Geophys. Res.*, 103, 31321-31329.
19. Eckermann, S. D., D. E. Gibson-Wilde, and J. T. Bacmeister, 1998: Gravity wave perturbations of minor constituents: a parcel advection methodology, *J. Atmos. Sci.*, 55, 3521-3539.
20. Carslaw, K.S., A. Tsias, J. T. Bacmeister, and Th. Peter, 1999: Widespread solid particle formation by mountain waves in the arctic stratosphere, *J. Geophys. Res.*, 104, 1827-1836.
21. Bacmeister, J. T., S. D. Eckermann, A. Tsias, K.S. Carslaw, and Th. Peter, 1999: Mesoscale cooling rates and temperature fluctuations in the stratosphere induced by a spectrum of gravity waves: A comparison of parameterizations and their impact on stratospheric microphysics, *J. Atmos. Sci.*, 56, 1913-1924.
22. Bacmeister, J. T., V. Kuell, D. Offermann, M. Riese, and J. W. Elkins, 1999: Intercomparison of satellite and aircraft observations of long-lived tracers using trajectory mapping, *J. Geophys. Res.*, 104, 16,379-16,390.

23. Sparling, L, and J. T Bacmeister, 2001: Scale-dependence of tracer micro-structure: PDFs, intermittency and the dissipation scale, *Geophys. Res. Lett.*, 28, 2823-2826.
24. Bacmeister, J. T., and M. J. Suarez, 2002: Wind-stress simulations and the equatorial momentum budget of an AGCM, *J. Atmos. Sci.*, 59, 3051-3073.
25. Preusse, P., A. Dörnbrack, S. D. Eckermann, M. Riese, B. Schaeler, J. T. Bacmeister, D. Broutman, and K. U. Grossmann, 2002: Space-based measurements of stratospheric mountain waves by CRISTA, 1, Sensitivity, analysis method, and a case study, *J. Geophys. Res.*, 107(D23), 8178, 10.1029/[2001JD000699](https://doi.org/2001JD000699).
26. Siskind, D. E., S. D. Eckermann, J. P. McCormack, M. J. Alexander, and J. T. Bacmeister, 2003: Hemispheric differences in the temperature of the summertime stratosphere and mesosphere, *J. Geophys. Res.* 108(D2), 4051, doi:10.1029/2002JD002095.
27. Schubert S. D., M. J. Suarez, P. J. Pegion, R. D. Koster, and J. T. Bacmeister, 2004: Causes of Long-Term Drought in the United States Great Plains, *Journal of Climate*, 17, 485–503.
28. Schubert, S. D., M. J. Suarez, P. J. Pegion, R. D. Koster, and J. T. Bacmeister, 2004: On the Cause of the 1930s Dust Bowl *Science*, 303, 1855-1859.
29. Zhang, M. H., W. Y. Lin, S. A. Klein, J. T. Bacmeister, S. Bony, R. T. Cederwall, A. D. Del Genio, J. J. Hack, N. G. Loeb, U. Lohmann, P. Minnis, I. Musat, R. Pincus, P. Stier, M. J. Suarez, M. J. Webb, J. B. Wu, S. C. Xie, M. -S. Yao, J. H. Zhang, 2005: Comparing Clouds And Their Seasonal Variations in 10 Atmospheric General Circulation Models With Satellite Measurements, *J. Geophys. Res.*, 110, doi: 10.1029/2004JD005021.
30. Bacmeister, J. T., M. J. Suarez, and F. Robertson, 2006: Rain re-evaporation, Boundary layer convection interaction and Pacific rainfall patterns in an AGCM, *J. Atmos. Sci.*, 63, 3383-3403 doi: 10.1175/JAS3791.1.
31. Lin, X, J.-L. Li, M. Suarez, A. Tompkins, D. E. Waliser, J. Bacmeister, M. Rienecker, J. Jiang, H.-T. Wu, C. Tassone, J.-D. Chern, B. D. Chen, H. Su., 2006: A View of Hurricane Katrina with Early 21st Century Technology. *EOS*, American Geophysical Union, Vol. 87, No. 41, 433, 440.
32. 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 Dynamics*, 27, 261–279, doi: 10.1007/s00382-006-0138-4.

33. Sobel, A. H., G. Bellon, and J. Bacmeister , 2007: Multiple equilibria in a single-column model of the tropical atmosphere, *Geophys. Res. Lett.*, *34*, L22804, doi:10.1029/2007GL031320.
34. Read, W. G., et al., 2007: Aura Microwave Limb Sounder upper tropospheric and lower stratospheric H<sub>2</sub>O and relative humidity with respect to ice validation, *J. Geophys. Res.*, *112*, D24S35, doi:10.1029/2007JD008752.
35. Schubert, S. D., M. J. Suarez, P. J. Pegion, R. D. Koster, and J. T. Bacmeister, 2007: Potential Predictability of Long-Term Drought and Pluvial Conditions in the U.S. Great Plains, *J. Clim.*, *21*, 802-816, doi: 10.1175/2007JCLI1741.1.
36. Li, J.F., D. Waliser, C. Woods, J. Teixeira, J. Bacmeister, J. Chern, B.-W. Shen, A. Tompkins, W.-K. Tao, and M. Köhler, 2008: Comparisons of satellites liquid water estimates to ECMWF and GMAO analyses, 20th century IPCC AR4 climate simulations, and GCM simulations, *Geophys. Res. Lett.* *35*, L19710, doi:10.1029/2008GL035427.
37. Lin, Jia-Lin, , B. E. Mapes , K. M. Weickmann, G. N. Kiladis, S. D. Schubert, M. J. Suarez, J. T. Bacmeister, M-I Lee , 2008: North American monsoon and convectively coupled equatorial waves simulated by IPCC AR4 Coupled GCMs., *J. Climate*, doi:10.1175/2007JCLI815.1.
38. Lin, Jia-Lin, K. M. Weickmann, G. N. Kiladis, B. E. Mapes, S. D. Schubert, M. J. Suarez, J. T. Bacmeister, M-I Lee , 2008: Subseasonal Variability Associated with Asian Summer Monsoon Simulated by 14 IPCC AR4 Coupled GCMs., *J. Climate*, doi:10.1175/2008JCLI816.1.
39. Chen, B., X. Lin, and J. Bacmeister, 2008: Frequency distributions of daily ITCZ patterns over the western Pacific warm pool, *J. Climate*, 2008, *21*, doi:10.1175/2008JCLI973.1.
40. Ott, L. E., J. Bacmeister, S. Pawson, K. Pickering, G. Stenchikov, M. Suarez, H. Huntreiser, M. Loewenstein, J. Lopez, and I. Xueref-Remy, 2008: An analysis of convective transport and parameter sensitivity in a single column version of the Goddard Earth Observation System, Version 5, General Circulation Model, *J. Atmos. Sci.*, doi: 10.1175/2008JAS2694.1.
41. Mapes, B, J. T. Bacmeister, M. Khairoutdinov, C. Hannay and M. Zhao. 2009: Virtual field campaigns on deep tropical convection in climate models. *Journal of Climate*, *22*, 244-257, DOI: 10.1175/2008JCLI2203.1
42. Waliser, D.E., JF Li, C. P. Woods, R. T. Austin, J. T. Bacmeister, J. Chern,. A. Del Genio, J.H. Jiang, Z. Kuang, H. Meng, H. and others, 2009: Cloud ice: A climate model challenge with signs and expectations of progress. *J. Geophys. Res.*, *114*, doi:10.1029/2008JD010015.

43. Jordan, N., R. Hoff and J. T. Bacmeister, 2010: Validation of Goddard Earth Observing System-version 5 (GEOS-5) Modern Era Re-analysis for Research (MERRA) PBL heights Using Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO), *J. Geophys. Res.*,(accepted).

### **Submitted**

1. Bacmeister, J. T., and G. L. Stephens, 2010: Spatial Statistics of likely Convective clouds in CloudSat data. Submitted to *J. Geophys. Res.*

### **Other External Refereed Publications**

1. Pierrehumbert, R. T., and J. T. Bacmeister, 1990: On the realizability of Long's model solutions for nonlinear, stratified flow over an obstacle. *Proc. Third Int. Conf. on Stratified Flow, Pasadena.* , Elsevier.
2. Bacmeister, J. T., S. D. Eckermann, L. Sparling, K. R. Chan, M. Loewenstein, and M. H. Proffitt, 1997: Analysis of intermittency in aircraft measurements of velocity, temperature and atmospheric tracers using wavelet transforms, NATO ASI Series, Vol. 1, *Gravity Wave Processes and their Parameterization in Global Climate Models* , ed. K. P. Hamilton, Springer Verlag, Heidelberg.
3. Eckermann, S. D., and J. T. Bacmeister, 1999: Global parameterization of gravity wave temperature perturbations for chemical and microphysical models, *Mesoscale processes in the stratosphere*, European Communities Air Pollution Research Report, No. 69, K. S. Carslaw and G. T. Amanatidis eds., 53-57.
4. Eckermann, S. D., D. Broutman, and J. T. Bacmeister, 2000: Aircraft encounters with mountain wave-induced clear air turbulence: Hindcasts and operational forecasts using an improved global model, Preprint Volume of the *Ninth Conference on Aviation, Range and Aerospace Meteorology*, 456-459, American Meteorological Society, 11-15 September, Orlando, FL.
5. Eckermann, S. D., P. Preusse, B. Schaeler, J. Oberheide, D. Offerman, J. T. Bacmeister and D. Broutman, 2001: Global gravity wave "weather" in the middle atmosphere: preliminary insights from the CRISTA-SPAS missions, Proceedings of the Solar Terrestrial and Space Physics Community, 13th. National Congress of the Australian Institute of Physics, ANARE Research Reports, Australian Antarctic Division, Kingston, Tasmania, R. J. Morris and P. J. Wilkinson eds., 146, 11-24.