

## DAVID M. STRAUS

Department of Atmospheric, Oceanic and Earth Sciences  
118 Research Hall, MSN 2B3, George Mason University  
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### EDUCATION:

1977 Ph.D. - Physics - Cornell University  
1970 B.A. - Physics with Distinction - University of Pennsylvania  
graduated *summa cum laude*

### PROFESSIONAL EXPERIENCE:

2009 - 2013 Chair, Dep't of Atmospheric, Oceanic and Earth Sciences, George Mason University  
2002 - present Professor of Climate Dynamics, George Mason University  
2005 - present Senior Research Scientist, Center for Ocean-Land-Atmosphere Studies  
1993 - 2005 Associate Research Scientist, Center for Ocean-Land-Atmosphere Studies  
1988 - 1993: Associate Research Scientist, Center for Ocean-Land-Atmosphere Interactions, University of Maryland, Dept. of Meteorology.  
1980 - 1988: Space Scientist, Laboratory for Atmospheric Sciences, NASA/GSFC  
1978 - 1980 National Research Council Postdoctoral Fellow, Modeling and Simulation Facility, NASA/GSFC  
1976 - 1978 Postdoctoral Fellow, Meteorology Dept., MIT.

### RECENT SERVICE:

Aug2009 – Aug2013 Chair, Dept. of Atmospheric, Oceanic and Earth Sciences (GMU)  
Aug2009 – Aug2012 Promotion and Tenure Committee (GMU)  
Jun – Nov 2009 Provost's Committee to Evaluate Dean of College of Sciences  
2007-present Member Science Team, Climate Change Prediction Program, Department of Energy  
2004-2008 Editor, Journal of Climate

### AWARDS

1969 *Phi Beta Kappa*  
1983 *Quality Increase Award*, NASA/GSFC  
1983 *Outstanding Performance Award* NASA/GSFC

### COURSES DEVELOPED:

CLIM 440 "Climate Dynamics."  
CLIM 710/610 "Introduction to the Physical Climate System."  
CLIM 753 "The General Circulation of the Atmosphere."

### **GRADUATE STUDENT ADVISING (Climate Dynamics PhD Program):**

Thesis Advisor:

Youkyoung Jang (May, 2011): “*The Atmospheric Influence of Tropical Diabatic Heating Associated with Developing ENSO on Indian Monsoon.*”

Erik Swenson (May, 2012): “*The Role of Sub-Seasonal Tropical Convective Variability for the Extratropical Response to ENSO.*”

Sara Amini (Apr 2018): “*The Impact of Large-Scale Circulation Regimes on Extreme Weather over Pacific and North America.*”

Priyanka Yadav (Apr 2018): “*The Character of the Mid-Latitude Response to the Fast and Slow Cycles of the Madden-Julian Oscillation Heating.*”

Mark Scafonas (Nov 2018): “*The Role of Moisture in the Sensitivity of Baroclinic Life Cycles to Warming Conditions: A Budget of Wave Activity.*”

Ralph Getzandanner (July 2019): “*Precursors to Euro-Atlantic Regime Transitions: The Role of Tropical Heating.*”

### **GRANTS (Recent):**

(1) PI: *Ensemble Prediction and Predictability of Extreme Weather via Circulation Regimes.* (Co-PIs: Kathleen Pegion, GMU, Stephen Baxter, NOAA). NOAA Office of Weather and Air Quality. Recommended for funding. Period: 9/1/2019 – 8/31/2022. Total GMU funding requested: \$471,763.

(2) PI: *Extremes of Indian Summer Monsoon Rainfall and their Relationship to Three-Dimensional Diabatic Heating over the Pacific and Indian Oceans: EQUINOO, IOD and ENSO.* Indian Ministry of Science. (Co –PI : Dr. Laurie Trenary, GMU). Period: 8/13/2018 – 8/12/2021. Total GMU funding: \$322,929.

(3) PI: *Predictability of the North Atlantic Oscillation on Intraseasonal Time Scales.* Office of Naval Research. Period: 3/1/2012 – 2/28/2017. Total GMU funding: \$628,665

(4) PI: *Mid-Latitude Circulation and Extremes in a Changing Climate.* Department of Energy Cooperative Agreement. (Co –PIs : Dr. Gang Chen, Cornell University, Dr. Jian Lu, PNNL, DOE). Period: 9/1/2014 – 8/31/2017. Total GMU funding: \$397,879

### **BOOK CHAPTERS:**

Lin, H., J. Frederiksen, D. Straus, and C. Stan. Tropical-Extratropical Interactions and Teleconnections, in *Sub-seasonal to Seasonal Prediction: The Gap Between Weather and Climate Forecasting*, (pp143-165), Elsevier, 2018. Eds. A. Robertson and F. Vitart, Elsevier, 2018. 585 pp. ISBN: 9780128117149

Straus, D., M., F. Molteni, and S. Corti: The Link between Weather and the Large Scale Circulation, in *Nonlinear and Stochastic Climate Dynamics*, Cambridge University Press, 2017, ISBN 9781107118140. Ed. C. Franzke.

Straus, D. M., and V. Krishnamurthy: The Preferred Structure of the Interannual Indian Monsoon Circulation Variability, in *Atmospheric and Oceanic Mesoscale Processes*, Ed. M. Sharan and S. Raman, Birkhauser Verlag AG, Basel, 2007.

Shukla, J., J. L. Kinter, E. K. Schneider and D. M. Straus: Modelling of the Climate System, in *Climate Change: An Integrated Perspective*, Eds. P. Martens and J. Rotmans, Kluwer Academic Publishers, Dordrecht, 1999.

**REFEREED JOURNAL PUBLICATIONS:**

Swenson, E. and D. Straus, 2019: The Role of Tropical Heating and Internal Variability in the California Response to the 2015/16 ENSO Event. *J. Atmos. Sci.* (revised version under review).

Yadav, P., D. Straus and E. Swenson, 2019: The Euro-Atlantic Response to the Madden-Julian Oscillation Cycle of Tropical Heating: Coupled GCM Intervention Experiments. *Atmos. – Ocean*, in press. DOI: 10.1080/07055900.2019.1626214

Stan, C. and D. M. Straus, 2019: The Impact of Cloud Representation on the Sub-Seasonal Forecast of Atmospheric Teleconnections and Preferred Circulation Regimes in the Northern Hemisphere. *Atmos.-Ocean*, <https://doi.org/10.1080/07055900.2019.1590178>.

Feng, X. B. Huang and D. Straus, 2018: Seasonal Prediction Skill and Predictability of the Northern Hemisphere Storm Track Variability in Project Minerva. *Climate Dynamics*, DOI: 10.1007/s00382-018-4520-9.

Swenson, E. T., J. Lu, and D. M. Straus, 2018: Resolution Dependence and Rossby Wave Modulation of Atmospheric Rivers in an Aquaplanet Model. *J. Geophys. Res. Atm.* **123**, 6297-6311.

Amini, S., and D. M. Straus, 2018: Control of storminess over the Pacific and North America by circulation regimes. *Clim. Dyn.*, <https://doi.org/10.1007/s00382-018-4409-7>

Yadav, P. and D. M. Straus, 2017: Circulation Response to Fast and Slow MJO Episodes. *Mon. Wea. Rev.*, **145**, 1577-1596.

Stan, C., D. M. Straus, J. S. Frederiksen, H. Lin, E. D. Maloney and C. Schumacher, 2017: Review of Tropical-Extratropical Teleconnections on Intraseasonal Time Scales. *Rev. Geophys.* doi: 10.1002/2016RG000538

Hannachi, A., D. M. Straus, C. E. Franzke, S. Corti and T. Woollings, 2017. Nonlinearity and Regime Behavior in the Northern Hemisphere Extra-Tropical Atmosphere: A Review. *Rev. Geophys.*, **55**, doi:10.1002/2015RG000509.

Swenson, E., and D. M. Straus, 2017: Rossby Wave Breaking and Transient Eddy Forcing During Euro-Atlantic Circulation Regimes. *J. Atmos. Sci.*, **74**, 1735-1755.

Swenson, E., and D. M. Straus, 2015: Transient Tropical Diabatic Heating and the Seasonal Mean Response to ENSO. *J. Atmos. Sci.*, **72**, No. 5: pp. 1891-1907.

Straus, D. M., E. Swenson and C.-L. Lappen, 2015: The MJO Cycle Forcing of the North Atlantic Circulation: Intervention Experiments with the Community Earth System Model. *J. Atmos. Sci.*, **72**, No. 2: pp. 660-681.

Kumar, S., P. A. Dirmeyer, D. M. Lawrence, T. DelSole, E. A. Altshuler, B. A. Cash, M. J. Fennessy, Z. Guo, J. L. Kinter and D. M. Straus, 2014: Effects of realistic land surface initializations on sub-

seasonal to seasonal climate predictability in a changing climate in North America: Soil Moisture and Temperature, *J. Geophys. Res.*, in press.

- Jang, Y., and D. M. Straus, 2013: Tropical Stationary Wave Response to ENSO: Diabatic Heating Influence on the Indian summer monsoon, *J. Atmos. Sci.*, **70**, 193-222. doi: <http://dx.doi.org/10.1175/JAS-D-12-036.1>
- Jang, Y., and D. M. Straus, 2012: The Indian Monsoon Circulation Response to El Nino Diabatic Heating. *J. Climate*, **25**, 7487-7508. doi: <http://dx.doi.org/10.1175/JCLI-D-11-00637.1>
- Paolino, D. A., J. L. Kinter III, B. P. Kirtman, D. Min, and D. M. Straus, 2011: The Impact of Land Surface and Atmospheric Initializations on Seasonal Forecasts with CCSM. *J Climate*, **25**, 1007-1021. <http://dx.doi.org/10.1175/2011JCLI3934.1>.
- Lee, S.-S., J.-Y. Lee, B. Wang, K.-J. Ha, K.-Y. Heo, F.-F. Jin, D. M. Straus, and J. Shukla, 2011: Interdecadal changes in the storm track activity over the North Pacific and North Atlantic. *Climate Dynamics*, **39**, 313-327. DOI:10.1007/s00382-011-1188-9
- Kirtman, B. P., E. K. Schneider, D. M. Straus, D. Min, R. Burgman, 2011: How Weather Impacts the Forced Climate Response. *Climate Dynamics*, **37**, 2389–2416. DOI 10.1007/s00382-011-1084-3.
- Molteni, F., M. P. King, F. Kucharski, and D. M. Straus, 2011: Planetary-scale variability in the northern winter and the impact of land-sea thermal contrast. *Climate Dynamics*, **37**, 151-170. DOI: 10.1007/s00382-010-0906-z.
- Straus, D. M., 2010: Synoptic-Eddy Feedbacks and Circulation Regime Analysis. *Mon. Wea. Rev.*, **138**, 4026-4034. doi: 10.1175/2010MWR3333.1.
- Kucharski, F., I.-S. Kang, D. M. Straus and M. P. King, 2010: Teleconnections in the Atmosphere and Oceans. *Bull. Amer. Met. Soc.*, **91**, 381-383, doi: 10.1175/2009BAMS2834.1
- Stan, S., M. Khairoutdinov, C. A. DeMott, V. Krishnamurthy, D. M. Straus, D. A. Randall, J. L. Kinter, and J. Shukla, 2010: An Ocean-Atmosphere Climate Simulation with an embedded cloud resolving model, *Geophys. Res. Lett.*, **37**, L01702, doi:10.1029/2009GL040822.
- Straus, D., and D. Paolino, 2009: Intermediate Time Error Growth and Predictability: Tropics vs. Midlatitudes. *Tellus*, **61A**, 579–586. DOI: 10.1111/j.1600-0870.2009.00411.x
- Stan, C., and D. M. Straus, 2009: Stratospheric Predictability and Sudden Stratospheric Warming Events. *J. Geophys. Res.-Atmospheres*, **114**, D12103. DOI: 10.1029/2008JD011277
- Kirtman, B. P., D. M. Straus, D. Min, E. K. Schneider, and L. Siqueira, 2009: Toward linking weather and climate in the interactive ensemble NCAR climate model. *Geophys. Res. Lett.*, **36**, L13705, doi:10.1029/2009GL038389.
- Zheng, X., D. M. Straus, C. S. Frederiksen, and S. Grainger, 2009: Potentially predictable patterns of seasonal mean geopotential heights in an ensemble of climate simulations with the COLA AGCM *Quart. J. Royal. Meteor. Soc.*, **135**, 1816 - 1829. DOI: 10.1002/qj.492.

- Stan, C., M. Khairoutdinov, C. A. DeMott, V. Krishnamurthy, D. M. Straus, D. A. Randall, J. L. Kinter III, and J. Shukla (2010), An ocean-atmosphere climate simulation with an embedded cloud resolving model, *Geophys. Res. Lett.*, **37**, L01702, doi:[10.1029/2009GL040822](https://doi.org/10.1029/2009GL040822).
- F. Kucharski, I.-S. Kang, D. Straus and M. P. King. 2010: Teleconnections in the Atmosphere and Oceans. *Bull. Amer. Met. Soc.*, **91**, 381-383. DOI: 10.1175/2009BAMS2834.1
- Zheng, X., D. M. Straus, and C. S. Frederiksen, 2008: A Variance Decomposition Approach to the Prediction of the Seasonal Mean Circulation: Comparison with Dynamical Ensemble Prediction using NCEP's CFS. *J. Royal. Meteor. Soc.*, **134**, 1997-2009. DOI: 10.1002/qj.330
- Straus, D. M., S. Corti and F. Molteni: 2007: Circulation Regimes: Chaotic Variability vs. SST-Forced Predictability, *J. Climate*, **20**, 2251-2272. DOI: 10.1175/JCLI4070.1
- Stan, C., and D. M. Straus, 2007: Is Blocking A Circulation Regime? *Mon. Wea. Rev.*, **135**, 2406-2413. DOI: 10.1175/MWR3410.1
- Straus, D. M., and V. Krishnamurthy, 2007: A Note on the Preferred Structure of the Interannual Indian Monsoon Circulation Variability, *PAGEOPH*, **164**, 1717-1732, DOI 10.1007/s00024-007-0248-x.
- Misra, V., L. Marx, J. Kinter, B. Kirtman, Z. Guo, D. Min, M. Fennessy, P. A. Dirmeyer, R. Kallummal and D. M. Straus, 2007: Validating and understanding the ENSO simulation in two coupled climate models. *Tellus*. **59A**, 292-308.
- Straus, D. M., and F. Molteni, 2004: Flow Regimes, SST Forcing, and Climate Noise: Results from Large GCM Ensembles, *J. Climate*, **17**, 1641-1656.
- Wu, Q., and D. M. Straus, 2004a: On the existence of hemispheric-wide climate variations. *J. Geophys. Res.*, **109**, No. D6. D06118 10.1029/2003JD004230.
- Wu, Q., and D. M. Straus, 2004b: AO, COWL and Observed Climate Trends, 2004: *J. Climate*, **17**, 2139-2156.
- Wu, Q., and D. M. Straus, 2003: Multiple Planetary Flow Regimes and the Eddy Forcing in Northern Hemisphere Wintertime Variability. *Geophys. Res. Lett.*, **30** (16), 1861-1865.
- Straus, D. M., D. Paolino, J. Shukla, S. Schubert, M. Suarez, A. Kumar, and P. Pegion, 2003: Predictability of the seasonal mean atmospheric circulation during autumn, winter and spring. *J. Climate*, **16**, 3629-3649.
- Straus, D. M., and J. S. Shukla, 2002: Does ENSO force the PNA? *J. Climate*, **15**, 2340-2358.
- Mo, Ruping, and D. M. Straus, 2002: Statistical-Dynamical Seasonal Prediction based on Principal Component Regression of GCM Ensemble Integrations. *Mon. Wea. Rev.*, **130**, 2167-2187.
- Kirtman, B. P., D. A. Paolino, J. L. Kinter III, and D. M. Straus, 2001: Impact of tropical subseasonal SST variability on seasonal mean climate simulation. *Mon. Wea. Rev.*, **129**, 853-868.

- Straus, D.M., and J. Shukla, 2000: Distinguishing between the SST-forced variability and internal variability in mid-latitudes: Analysis of observations and GCM simulations. *Quart. J. Roy. Met. Soc.*, **126**, 2323-2350.
- Shukla, J., D.A. Paolino, D.M. Straus, D. DeWitt, M. Fennessy, J.L. Kinter, L. Marx and R. Mo, 2000, Dynamical seasonal prediction with the COLA atmospheric model. *Quart. J. Roy. Met. Soc.*, **126**, 2265-2292.
- Shukla J. S., J. Anderson, D. Baumhefner, C. Brankovic, Y. Chang, E. Kalnay, L. Marx, T. Palmer, D. Paolino, J. Ploshay, S. Schubert, D. Straus, M. Suarez and J. Tribbia, 2000: Dynamical seasonal prediction. *Bull. Amer. Meteor. Soc.*, **81**, 2593-2606.
- Straus, D. M., and R. S. Lindzen, 2000: Planetary scale baroclinic instability and the MJO. *J. Atmos. Sci.*, **57**, 3609-3626.
- Straus, D.M., and P. Ditlevsen, 1999: Two-dimensional turbulence properties of the ECMWF reanalyses. *Tellus*, **51A**, 749-772.
- Straus, D. M. and Yi, Y., 1998: Interactions of synoptic and planetary waves: Scale-dependent forcing of a GCM. *Mon. Wea. Rev.*, **126**, 876-894.
- Straus, D. M., and Q. Yang, 1997: Vertical Structure and dominant horizontal scales of baroclinic waves in the NAS DAO and NCEP reanalyses. *Mon. Wea. Rev.*, **125**, 3266-3278.
- Straus, D. M., and J. Shukla, 1997: Variations of mid-latitude transient dynamics associated with ENSO. *J. Atmos. Sci.*, **54**, 777-790.
- Paolino, D. A., Q. Yang, B. Doty, J. Kinter, J. Shukla, and D. Straus 1995: Results of a Pilot Reanalysis Project at COLA. *Bull. Amer. Meteor. Soc.*, **76**, 697-710.
- Straus, D. M. and M.A. Huntley, 1994: Interactions between moist heating and dynamics in atmospheric predictability. *J. Atmos. Sci.*, **51**, 447-464.
- Straus, D. M., 1993: The mid-latitude development of regional errors in a global GCM. *J. Atmos. Sci.*, **50**, 2785-2799.
- Park, C.-K., D. M. Straus, and K.-M. Lau, 1990: An evaluation of the structure of tropical intraseasonal oscillations in three general circulation models. *J. Meteor. Soc. Japan*, **68**, 403-417.
- Straus, D. M., 1989: Baroclinic instability and wave-wave interactions in quasi-geostrophic error growth. *J. Atmos. Sci.*, **46**, 2380-2403.
- Straus, D. M., and J. Shukla, 1988a: A comparison of a GCM simulation of the seasonal cycle of the atmosphere to observations. Part I: Mean fields and the annual harmonic. *Atmosphere-Ocean*, **26**, 541-574.
- Straus, D. M., and J. Shukla, 1988b: A comparison of a GCM simulation of the seasonal cycle of the atmosphere to observations. Part II: Stationary waves and transient fluctuations. *Atmosphere-Ocean*, **26**, 575-607.

- Straus, D. M., R. S. Lindzen and A. DaSilva, 1987: The characteristic Rossby frequency. *J. Atmos. Sci.*, **44**, 1100-1105.
- Lindzen, R. S., D. M. Straus, and B. Katz, 1984: An observational study of large-scale atmospheric Rossby waves during FGGE. *J. Atmos. Sci.*, **41**, 1320-1335.
- Straus, D. M., 1983: Conservation laws of wave action and potential enstrophy for Rossby waves in a stratified atmosphere. *PAGEOPH*, **121**, 917-946.
- Straus, D. M., 1983: On the role of the seasonal cycle. *J. Atmos. Sci.*, **40**, 303-313.
- Straus, D. M., 1981: Long-wave baroclinic instability in the troposphere and stratosphere with spherical geometry. *J. Atmos. Sci.*, **38**, 409-426.
- Straus, D. M., and J. Shukla, 1981: Space-time spectral structure of a GLAS general circulation model and a comparison with observations. *J. Atmos. Sci.*, **38**, 902-917.
- Straus, D. M. and M. Halem, 1981: A stochastic-dynamical approach to the study of the natural variability of the climate. *Mon. Wea. Rev.*, **109**, 407-421.
- Charney, J. G. and D. M. Straus, 1981: Form-drag instability, multiple equilibria and propagating planetary waves in baroclinic, orographically forced planetary wave systems. *J. Atmos. Sci.*, **37**, 1157-1176.
- Straus, D. M. and N. W. Ashcroft, 1977: Self-consistent structure of metallic hydrogen. *Physical Review Letters*, **38**, 415-418.
- Straus, D. M., N. W. Ashcroft and H. Beck, 1977: Phase separation of metallic hydrogen-helium alloys. *Physical Review B*, **15**, 1914-1928.
- Straus, D. M. and N. W. Ashcroft, 1976: Thermal diffuse X-ray scattering in simple metals. *Physical Review B*, **14**, 448-458.
- Beck, H. and D. Straus, 1975: On the lattice dynamics of metallic hydrogen and other Coulomb systems. *Helvetica Physica Acta*, **48**.

#### **REFEREED ENCYCLOPEDIA ARTICLES:**

- Straus, D. M., 2018: Clustering Techniques in Climate Analysis. Oxford Research Encyclopedia of Climate Science. <http://climatescience.oxfordre.com>

#### **CONFERENCE ORGANIZATION (recent):**

Director of “Advanced School on Tropical-Extratropical Interactions on Intra-Seasonal Time Scales”, Oct 16-27, 2017. The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy (Co-Directors: S. Stan, A. Roberston, F. Kucharski)

Lead Organizer of “Large-Scale Intra-Seasonal Diabatic Heating Variability in the Tropics and Monsoon Regions: Multi-Scale Interactions and Teleconnections”, June 3 – 4, 2016. George Mason University

Director of “School and Workshop on Weather Regimes and Weather Types in the Tropics and Extratropics: Theory and Application to Prediction of Weather and Climate”, Oct 21-30, 2013. The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy (Co-Directors: F. Molteni, S. Corti, F. Kucharski)

Director of “School and Conference on the General Circulation of the Atmosphere and Oceans: A Modern Perspective”, July 11-15, 2011. The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy (Co-Directors: J. Shukla, F. Molteni, F. Kucharski)