

EDWIN P. GERBER

Professor of Mathematics and Atmosphere-Ocean Science
Center for Atmosphere Ocean Science, Department of Mathematics
Courant Institute of Mathematical Sciences
New York University

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RESEARCH INTERESTS

- Climate variability and change
- Atmospheric dynamics and circulation
- Stratosphere-troposphere interactions

EDUCATION

Princeton University, Princeton, NJ

Ph.D. in Applied and Computation Mathematics, 2006

Advisor: Geoffrey Vallis

Dissertation Committee: Isaac Held, Philip Holmes, and Paul Kushner

Fannie and John Hertz Foundation Fellowship, 2000 - 2005

The University of the South, Sewanee, TN

B.S. in Mathematics and Chemistry, 2000

Valedictorian, Class of 2000

RESEARCH EXPERIENCE

2008 to present **Courant Institute of Mathematical Sciences, New York University**
Professor (Associate Professor 2014-18, Assistant Professor 2008-14)

2011, **Max Planck Institute for Meteorology and Free University Berlin**
2014-2015 Visiting Scientist

Columbia University, New York NY
2006-2008 Postdoctoral Research Scientist with Professor Lorenzo M. Polvani,
Department of Applied Physics and Applied Mathematics

2002-2005 **Princeton University/Geophysical Fluid Dynamics Laboratory**, Princeton NJ
Research Assistant, Program in Applied and Computational Mathematics

2001 **Woods Hole Oceanographic Institute**, Woods Hole MA
Fellow in the Summer Program in Geophysical Fluid Dynamics

2000 **Institute for Defense Analysis, CCR-P**, Princeton NJ
SCAMP Summer Program in Mathematical Cryptology

1999 **Department of Defense**, Fort Meade MD, Director's Summer Program (Mathematics)

1998 **University of Vermont**, Burlington VT, REU Program in Chemistry

AWARDS

- 2021 **Bessel Research Award**, Alexander von Humboldt Foundation, Germany
2016 **Editor's Award**, J. Atmospheric Sciences, American Meteorological Society

TEACHING EXPERIENCE

- Courant Institute of Mathematical Sciences, New York University**
Graduate Courses: Atmospheric Dynamics, Climate Change, Climate Modeling,
2009 to Geophysical Fluid Dynamics, Synoptic Meteorology
present
Undergraduate Courses: Calculus I and II, Linear Algebra, Ordinary Differential
Equations, Fundamental Dynamics of the Earth's Atmosphere and Climate,
The Science and Policy of Climate Change
- Community Impact at Columbia University, New York NY**
2006-2008 GED (General Educational Development) mathematics instructor; taught algebra and
geometry to adults preparing for high school equivalency exams
- Princeton University, Princeton NJ**
2002 Lecturer for the Mathematics Department; Calculus I

RESEARCH SUPERVISION

Graduate Students

- Nolan Reilly, 2022-present
David Connelly, 2021-present
Marguerite Brown, 2021-present
Aman Gupta, Ph.D., 2020, now a postdoctoral scientist at LMU Munich
Kevin DallaSanta, Ph.D., 2019, now a postdoctoral fellow at NASA GISS
Naftali Cohen, Ph.D., 2014: now in industry
Xichen Li, Ph.D., 2014: now a Research Scientist a IAP, Chinese Academy of Sciences

Postdoctoral Research Scientists

- Aaron Match, 2021-present
Ofer Shamir, 2021-present
Minah Yang, 2021-present
Madeleine Youngs, 2020-present
Martin Jucker, 2014-2016: now a lecturer at University of New South Wales, Australia
Changhyun Yoo, 2011-2014: now a professor at Ehwa University, Korea

Masters Students

- Megan Lytle, M.S., 2016
Ho Yeung Hung, M.S., 2014

Undergraduate Students

- Emma Knobloch, 2021-22
Janya Mirpuri, 2021-22
Zihan Shao 2021-22
Dan Cao, 2020
Mihir Punji, 2019
Po Sheu (Portia) Chen, 2013

Clement Chen, 2010-11

Michael Hirsch, 2011

Kelly Sielert, 2009-10

Ph.D. Committee Member (External to NYU)

Justin Finkel, University of Chicago (2022)

Erik Lindgren, Massachusetts Institute of Technology (2018)

Lei Wang, University of Chicago (2016)

Oliver Watt-Meyer, University of Toronto (2016)

Aditi Sheshadri, Massachusetts Institute of Technology (2015)

Ph.D. Committee Member

Romeo Alexander (2020), Xinyang Wang (2019), Di Qi (2017),

Ray Yamada (2016), Chen Wei (2015), Carl Gladish (2012),

Maria Gehne (2012), Frédéric Laliberté (2011), Ross Tulloch (2010)

PROFESSIONAL SERVICE

2013-
present

Associate Editor, *Quarterly Journal of the Royal Meteorological Society*

2019-
present

Director of Graduate Studies, *PhD Program in Atmosphere Ocean Science and Mathematics, NYU-Courant*

2010-
present

Member of Scientific Steering Group and Co-chair (2013-19), DynVar (Dynamics and Variability) Activity of the Stratosphere-Troposphere Processes and their Role in Climate (SPARC) Project, World Climate Research Programme (WCRP)

2014-
present

Co-Chair, DynVar Model Intercomparison Project (DynVarMIP) for the Coupled Model Intercomparison Project, Phase 6 (CMIP6)

2014-
present

Member, Scientific Steering Group, Model Intercomparison Project on the climate response to Volcanic forcing (VolMIP) for CMIP6

2019-
present

Member, International Commission on the Middle Atmosphere, for International Association of Meteorology and Atmospheric Science (IAMAS)

2012-17

Chair, Middle Atmosphere Committee, American Meteorological Society

2013-15

Member, Scientific Steering Group, WCRP SPARC

2011, 18,
21

Panel Member, National Science Foundation, NASA

2004-
present

Reviewer, Journals: *J. Adv. in Model. Earth Syst.*, *Atmos. Chem. Phys.*, *Atmos.-Ocean*, *J. Atmos. Sci.*, *J. Climate*, *Climate Dynamics*, *Envir. Res. Lett.*, *Geophys. Model Dev.*, *J. Geophys. Res.-Atmos.*, *Geophys. Res. Lett.*, *Meteor. Zeitschrift*, *Mon. Weather Rev.*, *Nature Climate Change*, *Nature Geoscience*, *Proc. Nat. Acad. Sci.*, *Quarterly J. Royal Met. Soc.*, Proposals: British Natural Environmental Research Council (NERC), Civilian Research and Development Foundation (CRDF), Dutch Research Council (NWO), French National Research Agency (ANR), German-Israeli Foundation (GIF), German Research Foundation (DFG), Humboldt Foundation, National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), Natural Sciences and Engineering Research Council of Canada (NSERC), Quebec Research Fund - Nature and Technologies (FRQNT).

JURIED PUBLICATIONS (68 + 5 IN REVIEW) *denotes supervised student or postdoc

- Brown, M. L.*, O. Pauluis, and E. P. Gerber: Scaling for Saturated Moist Quasi-Geostrophic Turbulence, *J. Atmos. Sci.*, submitted.
- Finkel, J.*, E. P. Gerber, D. S. Abbot, and J. Weare: Revealing the statistics of extreme events hidden in short weather forecast data *AGU Advances*, submitted.
- Finkel, J.*, R. J. Webber, E. P. Gerber, D. S. Abbot, and J. Weare: Exploring stratospheric rare events with transition path theory and short simulations, *J. Atmos. Sci.*, submitted.
- Garfinkel, C. I., I. White, E. P. Gerber, S.-W. Son and M. Jucker: Stationary waves weaken and delay the near-surface response to stratospheric ozone depletion, *J. Climate*, submitted.
- Match, A.* and E. P. Gerber: Tropospheric expansion under global warming reduces tropical lower stratospheric ozone, *Geophys. Res. Lett.*, submitted.
- 2022 Espinosa, Z. I., A. Sheshadri, G. R. Cain, E. P. Gerber, and K. J. DallaSanta: Machine Learning Gravity Wave Parameterization Generalizes to Capture the QBO and Response to Increased CO₂, *Geophys. Res. Lett.*, 49, e2022GL098174, doi:10.1029/2022GL098174.
- 2022 Garfinkel, C. I., E. P. Gerber, O. Shamir, J. Rao, M. Jucker, I. White, and N. Paldor: A QBO cookbook: Sensitivity of the Quasi-Biennial Oscillation to resolution, resolved waves, and parameterized gravity waves, *J. Adv. Model. Earth Syst.*, 14, e2021MS002568, doi: 10.1029/2021MS002568.
- 2022 Gerber, E. P., P. Martineau, B. Ayarzagüena, D. Barriopedro, T. J. Bracegirdle, A. H. Butler, N. Calvo, S. C. Hardiman, P. Hitchcock, M. Iza, U. Langematz, H. Lua, G. Marshall, A. Orr, F. M. Palmeiro, S.-W. Son, and M. Taguchi: Extratropical Stratosphere–troposphere Coupling, In *Stratosphere-troposphere Processes and their Role in Climate (SPARC) Reanalysis Intercomparison Project* (Chap. 6), M. Fujiwara, G. L. Manney, L. Gray, and J. S. Wright, Eds., Oberpfaffenhofen Germany, SPARC, in press.

- 2021 Finkel, J.* , R. J. Webber, E. P. Gerber, D. S. Abbot, and J. Weare: Learning forecasts of rare stratospheric transitions from short simulations, *Mon. Wea. Rev.*, 149, 3647-3669, doi: 10.1175/MWR-D-21-0024.1.
- 2021 Linz, M., R. A. Plumb, A. Gupta, and E. P. Gerber: Stratospheric adiabatic mixing rates derived from the vertical gradient of age of air, *J. Geophys. Res. Atmos.*, 126, e2021JD035199, doi: 10.1029/2021JD035199.
- 2021 Li, X., W. Cai, G. A. Meehl , D. Chen , X. Yuan , M. Raphael, D. M. Holland, Q. Ding, R. L. Fogt, B. R. Markle, G. Wang, D. Bromwich, J. Turner , S.-P. Xie, S. T. Gille, C. Xiao, B. Wu, M. A. Lazzara, E. J. Steig, X. Chen, S. Stammerjohn, P. R. Holland, M. M. Holland, S. F. Price, Z. Wang, C. M. Bitz, J. Shi, X. Cheng, E. P. Gerber, X. Liang, H. Goosse, C. Yoo, M. Ding, L. Geng, M. Xin, C. Li, T. Dou, C. Liu, W. Sun, X. Wang, and C. Song: Antarctic Climate Changes Attributable to Teleconnections from the Tropics, *Nature Rev. Earth Envir.*, 10.1038/s43017-021-00204-5.
- 2021 Gupta, A.* , E. P. Gerber, R. A. Plumb, and P. H. Lauritzen: Numerical impacts on tracer transport: diagnosing the influence of dynamical core formulation and resolution on stratospheric transport, *J. Atmos. Sci.*, 78, 3575-3592, doi: 10.1175/JAS-D-21-0085.1.
- 2021 Garfinkel, C. I, I. White, E. P. Gerber, O. Adam, and M. Jucker: Nonlinear Interaction between the Drivers of the Monsoon and Summertime Stationary Waves *Geophys. Res. Lett.*, 48, e2020GL092321, doi:10.1029/2020GL092321.
- 2021 Orr, A., H. Lu, P. Martineau, E. P. Gerber, G. Marshall, and T. J. Bracegirdle. Is our dynamical understanding of the circulation changes associated with the Antarctic ozone hole sensitive to the choice of reanalysis dataset? *Atmos. Chem. Phys.*, 21, 7451–7472, doi:10.5194/acp-21-7451-2021.
- 2021 Baldwin, M., B. Ayarzagüena, T. Birner, N. Butchart, A. H. Butler, A. J. Charlton-Perez, D. I. V. Domeisen, C. I. Garfinkel, H. Garny, E. P. Gerber, M. I. Hegglin, U. Langematz, N. M. Pedatella: Sudden Stratospheric Warmings, *Rev. Geophys.*, 59, e2020RG000708, doi:10.1029/2020RG000708.
- 2020 Ayarzagüena, B., and 20 coauthors including E. P. Gerber. Uncertainty in the response of sudden stratospheric warmings and stratosphere-troposphere coupling to quadrupled CO₂ concentrations in CMIP6 models, *J. Geophys. Res. Atmos.*, 125, e2019JD032345, doi:10.1029/2019JD032345.
- 2020 DallaSanta, K.* and E. P. Gerber. Downward migration of the zonal-mean circulation in the tropical atmosphere, *Geophys. Res. Lett.*, 47, e2020GL088084, doi:10.1029/2020GL088084.
- 2020 Garfinkel, C. I., I. White, E. P. Gerber, M. Jucker, and M. Erez. The building blocks of Northern Hemisphere wintertime stationary waves, *J. Climate*, 33, 5611–5633, doi:10.1175/JCLI-D-19-0181.1.
- 2020 Garfinkel, C. I., I. White, E. P. Gerber, and M. Jucker. The impact of SST biases in the tropical east Pacific and Agulhas current region on atmospheric stationary waves in the Southern Hemisphere. *J. Climate*, 33, 9351–9374, doi:10.1175/JCLI-D-20-0195.1.

- 2020 Gupta, A.*, E. P. Gerber, and P. H. Lauritzen. Numerical impacts on tracer transport: A proposed intercomparison test of Atmospheric General Circulation Models. *Quart. J. Roy. Meteor. Soc.*, 1–28, doi:10.1002/qj.3881.
- 2020 White, I., C. I. Garfinkel, E. P. Gerber, M. Jucker, P. Hitchcock, and J. Rao. The generic nature of the tropospheric response to sudden stratospheric warmings. *J. Climate*, 33, 5589–5610, doi:10.1175/JCLI-D-19-0697.1.
- 2019 Butler, A., A. Charlton-Perez, D. I. V. Domeisen, C. Garfinkel, E. P. Gerber, P. Hitchcock, A. Y. Karpechko, A. C. Maycock, M. Sigmond, I. Simpson, and S.-W. Son. Sub-seasonal Predictability and the Stratosphere, *Sub-seasonal to Seasonal Prediction: The Gap Between Weather and Climate Forecasting*, A. W. Robson and F. Vitart, Eds., 223-241, doi:10.1016/B978-0-12-811714-9.00011-5.
- 2019 DallaSanta, K.*, E. P. Gerber, and M. Toohey. The Circulation Response to Volcanic Eruptions: The Key Roles of Stratospheric Warming and Eddy Interactions. *J. Climate*, 32, 1101-1120, doi:10.1175/JCLI-D-18-0099.1.
- 2019 Gerber, E. P., K. DallaSanta*, and A. Gupta*, Imagining Simpler Worlds to Understand the Complexity of Our Own. *J. Adv. in Model. Earth Syst.*, 11, 2862–2867, doi:10.1029/2019MS001753.
- 2019 Maher, P., E. P. Gerber, B. Medeiros, T. Merlis, S. Sherwood, A. Sheshadri, A. Sobel, G. Vallis, A. Voigt, and P. Zurita-Gotor. Model hierarchies for understanding atmospheric circulation. *Rev. Geophys.*, 57, 250-280, doi:10.1029/2018RG000607.
- 2019 White, I., C. Garfinkel, E. P. Gerber, M. Jucker, V. Aquila, and L. Oman. The Downward Influence of Sudden Stratospheric Warmings: Association with Tropospheric Precursors. *J. Climate*, 32, 85-108 doi:10.1175/JCLI-D-18-0053.1. .
- 2018 Butler, A. and E. P. Gerber. Optimizing the definition of a sudden stratospheric warming, *J. Climate*, 31, 2337-2344, doi:10.1175/JCLI-D-17-0648.1.
- 2018 E. P. Gerber and P. Martineau. Quantifying the variability of the annular modes: Reanalysis uncertainty vs. sampling uncertainty. *Atmos. Chem. Phys.*, 18, 17099-17117, doi:10.5194/acp-18-17099-2018.
- 2018 Vallis, G. K., G. Colyer, R. Geen, E. P. Gerber, M. Jucker, P. Maher, A. Paterson, M. Pietschnig, J. Penn, and Stephen I. Thomson. Isca, v1.0: A Framework for the Global Modelling of the Atmospheres of Earth and Other Planets at Varying Levels of Complexity *Geosci. Model. Dev.*, 11, 843-859, doi:10.5194/gmd-11-843-2018.
- 2017 Gerber, E. P. and D. W. J. Thompson. What Makes an Annular Mode “Annular”?, *J. Atmos. Sci.*, 74, 317-332, doi:10.1175/JAS-D-16-0191.1.
- 2017 Fujiwara, M. and 35 coauthors including Gerber, E. P. Introduction to the SPARC Reanalysis Intercomparison Project (SRIP) and overview of the reanalysis systems, *Atmos. Chem. Phys.*, 17, 1417-1452, doi:10.5194/acp-17-1417-2017.
- 2017 Jucker, M.* and E. P. Gerber. Untangling the annual cycle of the tropical tropopause layer with an idealized moist model, *J. Climate*, 30, 7339-7358, doi:10.1175/JCLI-D-17-0127.1.

- 2017 Kim, J., S.-W. Son, E. P. Gerber, and H.-S. Park. Defining Sudden Stratospheric Warmings in Models: Accounting for Biases in Model Climatologies, *J. Climate*, 30, 5529-5546, doi:10.1175/JCLI-D-16-0465.1.
- 2017 Linz, M., R. A. Plumb, E. P. Gerber, F. J. Haenel, G. Stiller, D. E. Kinnison, A. Ming, J. Neu, and S. Solomon. The strength of the meridional overturning circulation of the stratosphere, *Nature Geosci.*, 10, 663-667, doi:10.1038/ngeo3013.
- 2016 Gerber, E. P. and E. Manzini. The Dynamics and Variability Model Intercomparison Project (DynVarMIP) for CMIP6: Assessing the Stratosphere - Troposphere System *Geosci. Model Dev.*, 9, 3413-3425, doi:10.5194/gmd-9-3413-2016.
- 2016 Linz, M., R. A. Plumb, E. P. Gerber, and A. Sheshadri. The relationship between age of air and the diabatic circulation of the stratosphere, *J. Atmos. Sci.*, 73, 4507-4518, doi:10.1175/JAS-D-16-0125.1.
- 2016 Oberlander-Hayn, S., E. P. Gerber, and 10 CCM1 co-authors. Is the Brewer-Dobson circulation increasing, or moving upward? *Geophys. Res. Lett.*, **43** doi:10.1002/2015GL067545.
- 2016 Tripathi, O. P., M. Baldwin, A. Charlton-Perez, M. Charron, J. C. H. Cheung, S. D. Eckermann, E. Gerber, D. R. Jackson, Y. Kuroda, A. Lang, J. McLay, R. Mizuta, C. Reynolds, G. Roff, M. Sigmond, S.-W. Son, and T. Stockdale. Examining the Predictability of the Stratospheric Sudden Warming of January 2013 Using Multiple NWP Systems, *Mon. Wea. Rev.*, 144, 1935-1960 doi:10.1175/MWR-D-15-0010.1.
- 2016 Pendergrass, A. and E. P. Gerber. The rain is askew: Two idealized models relating the vertical velocity and precipitation distributions, *J. Climate*, 29, 6445-6462, doi:10.1175/JCLI-D-16-0097.1.
- 2016 Wenzel, S., V. Eyring, E. P. Gerber and A. Yu. Karpechko. Constraining Future Austral Jet Stream Position and Shifts in the CMIP5 Ensemble by Process-oriented Multiple Diagnostic Regression *J. Climate*, **29**, 673-687, doi:10.1175/JCLI-D-15-0412.1.
- 2016 Zanchettin, D and 23 coauthors including E. P. Gerber. The Model Intercomparison Project on the climatic response to Volcanic forcing (VolMIP): Experimental design and forcing input data *Geophys. Model. Dev.*, **9**, 2701-2719, doi:10.5194/gmd-9-2701-2016.
- 2015 Li, X.*, E. P. Gerber, D. M. Holland, and C. Yoo*. A Rossby Wave Bridge from the Tropical Atlantic to West Antarctica . *J. Climate*, **28**, 2256–2273, doi:10.1175/JCLI-D-14-00450.1.
- 2015 Li, X.*, D. M. Holland, E. P. Gerber, and C. Yoo*. Rossby waves mediate impacts of tropical oceans on West Antarctic atmospheric circulation. *J. Climate*, **28** 8151-8164, doi:10.1175/JCLI-D-15-0113.1.
- 2015 Sheshadri, A., R. A. Plumb, and E. P. Gerber. Seasonal variability of the polar stratospheric vortex in an idealized AGCM with varying tropospheric wave forcing *J. Atmos. Sci.*, **72**, 2248-2266, doi:10.1175/JAS-D-14-0191.1.
- 2014 Cohen, N. Y.*, E. P. Gerber, and O. Bühler. What drives the Brewer-Dobson Circulation? *J. Atmos. Sci.*, **71**, 3837-3855, doi:10.1175/JAS-D-14-0021.1.

- 2014 Gerber, E. P. and S.-W. Son. Quantifying the Summertime Response of the Austral Jet Stream and Hadley Cell to Stratospheric Ozone and Greenhouse Gases. *J. Climate.*, **27**, 5538-5559, doi:10.1175/JCLI-D-13-00539.1
- 2014 Li, X.*, D. M. Holland, E. P. Gerber, and C. Yoo*. Impacts of North and Tropical Atlantic Ocean on the Antarctic Peninsula and Sea Ice. *Nature*, **505**, 538-542, doi:10.1038/nature12945.
- 2014 Manzini, E., A. Yu. Karpechko and 21 Coauthors (including E. P. Gerber). Northern winter climate change: Assessment of uncertainty in CMIP5 projections related to stratosphere – troposphere coupling. *J. Geophys. Res. Atmos.*, **119**, doi:10.1002/2013JD021403.
- 2014 Tripathi, O. and 15 Coauthors (including E. P. Gerber). Review: The Predictability of the Extra-tropical Stratosphere on monthly timescales and its Impacts on the Skill of Tropospheric Forecasts. *Quart. J. Roy. Met. Soc.*, in press, doi:10.1002/qj.2432.
- 2014 Zurita-Gotor, P., J. Blanco-Fuentes, and E. P. Gerber. Eddy feedbacks and zonal index persistence in the two-layer model. *J. Atmos. Sci.*, **71**, 410-429, doi:10.1175/JAS-D-13-0102.1.
- 2013 Charlton-Perez, A. J. and 27 authors including E. P. Gerber. On the lack of stratospheric dynamical variability in low-top versions of the CMIP5 models. *J. Geophys. Res. Atmos.*, **118**, 2494-2505, doi:10.1002/jgrd.50125.
- 2013 Cohen, N. Y.*, E. P. Gerber, and O. Bühler. Compensation between resolved and unresolved wave driving in the Stratosphere: Implications for downward control. *J. Atmos. Sci.*, **70**, 3780-3798, doi:10.1175/JAS-D-12-0346.1.
- 2013 Garfinkel, C. I., D. W. Waugh and E. P. Gerber. The Effect of Tropospheric Jet Latitude on Coupling between the Stratospheric Polar Vortex and the Troposphere. *J. Climate*, **26**, 2077-2097, doi:10.1175/JCLI-D-12-00301.1.
- 2013 Sherwood, S. C., M. J. Alexander, A. R. Brown, N. A. McFarlane, E. P. Gerber, G. Feingold, A. A. Scaife, and W. W. Grabowski. Climate Processes: Clouds, Aerosols and Dynamics. *Climate Science for Serving Society: Research, Modelling and Prediction Priorities*, G. R. Asrar, J. W. Hurrell, Eds., 73-103, doi:10.1007/978-94-007-6692-1_4
- 2013 Tandon, N. F., E. P. Gerber, A. H. Sobel, and L. M. Polvani. Understanding Hadley Cell Expansion vs. Contraction: Insights from Simplified Models and Implications for Recent Observations. *J. Climate*, **26**, 4304-4321, doi:10.1175/JCLI-D-12-00598.1.
- 2013 Ueyama, R., E. P. Gerber, J. M. Wallace and D. M. W. Frierson. The role of high-latitude waves in the intraseasonal to seasonal variability of tropical upwelling in the Brewer-Dobson circulation. *J. Atmos. Sci.*, **70**, 1631-1648, doi:10.1175/JAS-D-12-0174.1.
- 2012 Gerber, E. P. Stratospheric versus Tropospheric Control of the Strength and Structure of the Brewer-Dobson Circulation. *J. Atmos. Sci.*, **69**, 2857-2877, doi:10.1175/JAS-D-11-0341.1.

- 2012 Gerber, E. P., A. Butler, N. Calvo, A. Charlton-Perez, M. Giorgetta, E. Manzini, J. Perlwitz, L. M. Polvani, F. Sassi, A. A. Scaife, T. A. Shaw, and S. Watanabe. Assessing and Understanding the Impact of Stratospheric Dynamics and Variability on the Earth System. *Bull. Am. Meteor. Soc.*, **93**, 845-859, doi: 10.1175/BAMS-D-11-00145.1.
- 2012 Ndarana, T., D. W. Waugh, L. M. Polvani, G. J. P. Correa, and E. P. Gerber. Antarctic Ozone Depletion and trends in tropospheric Rossby wave breaking. *Atmos. Science Lett.*, **13**, 164-168, doi: 10.1002/asl.384.
- 2012 Tomassini, L., E. P. Gerber, F. Bunzel and M. Giorgetta, 2012: The role of stratosphere-troposphere coupling in the occurrence of extreme winter cold spells over Northern Europe. *J. Adv. Model. Earth Syst.*, **4**, M00A03, doi:10.1029/2012MS000177.
- 2012 Wang, S., E. P. Gerber, and L. M. Polvani. Abrupt Circulation Responses to Upper Tropospheric Warming in a Relatively Simple Stratosphere-Resolving AGCM. *J. Climate*, **25**, 4097-4115, doi:10.1175/JCLI-D-11-00166.1.
- 2010 Gerber, E. P., M. P. Baldwin, and CCMVal-2 Coauthors. Stratosphere-Troposphere Coupling and Annular Mode Variability in Chemistry-Climate Models. *J. Geophys. Res.*, **115**, D00M06, doi:10.1029/2009JD013770.
- 2010 Kidston, J. and E. P. Gerber. Intermodel Variability of the Poleward Shift of the Austral Jet Stream in the CMIP3 Integrations Linked to Biases in 20th Century Climatology. *Geophys. Res. Lett.*, **37**, L09708, doi:10.1029/2010GL042873.
- 2010 Son, S.-W., E. P. Gerber, J. Perlwitz, L. M. Polvani, N. Gillett, K.-H. Seo, and CCMVal-2 coauthors. The Impact of Stratospheric Ozone on Southern Hemisphere Circulation Changes: A Multimodel Assessment. *J. Geophys. Res.*, **115**, D00M07, doi:10.1029/2010JD014271.
- 2009 Gerber, E. P., C. Orbe and L. M. Polvani. Stratospheric Influence on the Tropospheric Circulation Revealed by Idealized Ensemble Forecasts. *Geophys. Res. Lett.*, **36**, L24801, doi:10.1029/2009GL040913. **Editors' Highlight**
- 2009 Gerber, E. P. and L. M. Polvani. Stratosphere-troposphere Coupling in a Relatively Simple AGCM: The Importance of Stratospheric Variability. *J. Climate*, **22**, 1920-1933, doi:10.1175/2008JCLI2548.1.
- 2009 Gerber, E. P. and G. K. Vallis. On the Zonal Structure of the Annular Modes and NAO. *J. Atmos. Sci.*, **66**, 332-353, doi:10.1175/2008JAS2682.1.
- 2008 Gerber, E. P., L. M. Polvani, and D. Ancukiewicz. Annular Mode Time Scales in the Intergovernmental Panel on Climate Change Fourth Assessment Report Models. *Geophys. Res. Lett.*, **35**, doi:10.1029/2008GL035712.
- 2008 Gerber, E. P., S. Voronin, and L. M. Polvani. Testing the Annular Mode Autocorrelation Timescale in Simple Atmospheric General Circulation Models. *Mon. Weather Rev.*, **136**, 1523-1536, doi:10.1175/2007MWR2211.1.
- 2008 Vallis, G. K. and E. P. Gerber. Local and Hemispheric Dynamics of the North Atlantic Oscillation, Annular Patterns, and the Zonal Index. *Dyn. Atmos. Oceans*, **44**, 184-212, doi:10.1016/j.dynatmoce.2007.04.003.

- 2007 Gerber, E. P. and G. K. Vallis. Eddy-Zonal Flow Interactions and the Persistence of the Zonal Index *J. Atmos. Sci.*, **64**, 3296-3311, doi:10.1175/JAS4006.1.
- 2005 Gerber, E. P. and G. K. Vallis. A Stochastic Model for the Spatial Structure of Annular Patterns of Variability and the NAO. *J. Climate*, **18**, 2102-2118, doi:10.1175/JCLI3337.1.
- 2004 Vallis, G. K., E. P. Gerber, P. J. Kushner and B. A. Cash. A Mechanism and Simple Dynamical Model of the North Atlantic Oscillation and Annular Modes. *J. Atmos. Sci.*, **61**, 264-280, doi:10.1175/1520-0469(2004)061<0264:AMASDM>2.0.CO;2.

REPORTS AND OTHER CONTRIBUTIONS

- 2015 E. P. Gerber. The Stratosphere and its Coupling to the Troposphere and Beyond. *Encyclopedia of Applied and Computational Mathematics*, B. Engquist, Ed., Springer-Verlag, Berlin and Heidelberg, 1676 pp.
- 2014 Arblaster, J. M., N. P. Gillett, 6 coauthors, and 16 contributors including E. P. Gerber. Stratospheric Ozone Changes and Climate, Chapter 4 in the *Scientific Assessment of Ozone Depletion: 2014*, WMO Global Ozone Research and Monitoring Project, Report No. 55.
- 2010 Baldwin, M. P., N. P. Gillett, P. M. Forster, E. P. Gerber, M. I. Hegglin, A. Y. Karpechko, J. Kim, P. J. Kushner, O. H. Morgenstern, T. Reichler, S.-W. Son, and K. Tourpali: Effects of the stratosphere on the troposphere, Chapter 10 in SPARC Report on the Evaluation of Chemistry-Climate Models, V. Eyring, T. G. Shepherd, D. W. Waugh (Eds.), SPARC Report No. 5, WCRP-132, WMO/TD-No. 1526.
- 2005 Gerber, E. P., Ph.D Thesis: *A Dynamical and Statistical Understanding of the North Atlantic Oscillation and Annular Modes*, Princeton University, 252 pp.

RESEARCH GRANTS

- 2021-2025 **US-Israel Binational Science Foundation, Award 2020316:** Circulation response to changes in cloud radiative forcing under global warming: From the zonal mean to regional changes [Collaboration with Chaim Garfinkel at Hebrew University, Jerusalem]
- 2021-2026 **The Eric and Wendy Schmidt Fund For Strategic Innovation**
A Data-Informed Framework for the Representation of Subgrid Scale Gravity Waves to Improve Climate Prediction VESRI Project [Collaboration with Ulrich Achatz (Goethe U.-Frankfurt), Joan Alexander (NWRA), Pedram Hassanzadeh (Rice), Francois Lott (LMD), Adam Scaife (MetOffice), Aditi Sheshardri (Stanford), and Claudia Stephan (MPI for Meteorology)]
- 2020-2025 **NSF Cyberinfrastructure for Sustained Scientific Inquiry, OAC-2005123**
Collaborative Research: Framework: Improving the understanding and representation of atmospheric gravity waves using high-resolution observations and machine learning [Collaboration with Joan Alexander (NWRA), Pedram Hassanzadeh (Rice), and Aditi Sheshardri (Stanford)]

- NSF Division of Atmospheric and Geospace Sciences, AGS-1852727**
 2019-2022 The jet streams in a warming world: Incorporating moisture into our understanding of midlatitude circulation change
- Subcontract through ERC Grant to Hebrew University-Jerusalem**
 2016-2021 Forecasting Surface Weather and Climate at One-Month Leads through the Stratosphere-Troposphere [Collaboration with Chaim Garfinkel, HUJI]
- NSF Division of Atmospheric and Geospace Sciences, AGS-1546585**
 2015-2018 Stratospheric Age in a Changing Climate: Connecting Theory, Models, and Observations [Collaboration with Alan Plumb, MIT]
- NSF Division of Atmospheric and Geospace Sciences, AGS-1264195**
 2013-2016 Understanding the Response of the Austral Jet Stream to Changes in Greenhouse Gases and Stratospheric Ozone
- NSF Division of Atmospheric and Geospace Sciences, AGS-0938325**
 2010-2013 Assessing the Impact of Parameterized Gravity Wave Drag on Climate Change Forecasts: A Systematic Investigation with Global Circulation Models

MEETING AND SESSION ORGANIZER

- Oct. 22-25, 2019 5th SPARC DynVar Workshop, Madrid Spain
Atmospheric Circulation in a Changing Climate
- June 6-10, 2016 4th SPARC DynVar Workshop, Helsinki Finland, *The Large-Scale Atmospheric Circulation: Confronting Model Biases and Uncovering Mechanisms*
- May 16-20, 2016 SPARC Symposium on Gravity Waves, State College PA
- Dec. 9-13, 2013 Session on Ozone-Climate Connections, AGU Fall Meeting
- June 17-22, 2013 17th AMS Conference on the Middle Atmosphere, Newport RI
- April 22-24, 2013 3rd SPARC DynVar Workshop, Reading UK
- Dec. 15-19, 2008 Session on Geophysical Fluid Dynamics Theory and Obs., AGU Fall Meeting
- Dec. 10-14, 2007 Session on Idealized Climate Modeling, AGU Fall Meeting

INVITED CONFERENCE AND WORKSHOP PRESENTATIONS

- SIAM Conference on Mathematics of Planet Earth** (Pittsburgh)
 July 15, 2022 Data Driven Representation of Un(der)resolved Processes in Atmospheric Models: A Case Study of Gravity Waves and the QBO
- Confronting Climate Change, Inst. for Mathematical and Statistical Innovation**
 Mar. 5, 2021 Atmospheric model hierarchies: A bridge from theory to climate prediction
- AGU Fall Meeting** (San Francisco) “Abrupt changes in the extratropical circulation of the atmosphere: Dynamic vs. Thermodynamic Regimes”
 Dec., 14 2020
- AGU Fall Meeting** (San Francisco) “Downward migration of the zonal-mean circulation in the tropical atmosphere”
 Dec. 11, 2019

- Nov. 19, 2019 **ECMWF Workshop on Stratospheric predictability and Impact on the Troposphere** (Reading, UK) “Trace Gas Transport in the Stratosphere: Opportunities and Challenges”
- Sept. 23, 2019 **Climate and Wave Dynamics Workshop** (Eilat, Israel) “The Circulation Response to Volcanic Eruptions”
- June 10, 2019 **Alan Plumb Retirement Celebration** (Cambridge MA) “The Incredible Shrinking Stratosphere ”
- Jan. 7-10, 2019 **AMS Annual Meeting: 20th Conference on the Middle Atmosphere** (Phoenix, AZ) “The annular modes in reanalyses: The value of conventional and surface-observation input reanalyses in the Northern Hemisphere”
- Dec. 12-16, 2016 **AGU Fall Meeting** (San Francisco) “Untangling the tropical tropopause layer with an idealized moist model: Tropical vs. extratropical control”
- May. 16-20, 2016 **SPARC Symposium on Gravity waves** (State College PA) “How should we quantify the role of gravity wave driving in the Brewer-Dobson Circulation?”
- Feb. 16-19, 2016 **SPARC Workshop on Stratospheric Change and its Role for Climate Prediction** (Berlin), “The tropical tropopause layer in an idealized moist model: Tropical vs. extratropical control”
- Aug. 25-28, 2015 **WCRP Workshop on Storm Tracks** (Grindelwald, Switzerland) “Storm tracks in comprehensive climate models”
- Jan. 12-17, 2014 **2014 SPARC General Assembly** (Queenstown, NZ) “Understanding and predicting the Brewer-Dobson circulation”
- Feb. 25-
Mar. 1, 2013 **WCRP Special Workshop on Climatic Effects of Ozone Depletion in the Southern Hemisphere** (Buenos Aires), *Keynote Speaker* “The Influence of Ozone Depletion on the Atmospheric Circulation”
- June 25-29, 2012 **SPARC Workshop on the Brewer-Dobson Circulation** (Grindelwald, Switzerland) “Mechanisms Driving the BDC: A perspective from idealized models”
- October
24-28, 2011 **WCRP Open Science Conference** (Denver CO) *Best Presentation Award, Early Career Scientist* “Modeling the extratropical jets: Connections between the mean climate, variability, and response to anthropogenic forcing”
- October
19-21, 2011 **7th CLIVAR Southern Ocean Panel Workshop** (Boulder CO) “Climate Change and Variability in the Southern Hemisphere: An Atmospheric Dynamics Perspective”
- Sept. 28-30, 2011 **International Max Planck Research School on Earth Systems Modeling, Annual Retreat** (Reinstorf, Germany) “The upper atmosphere in the Earth system and in Earth system modeling”

- August 8-14,
2010 **MFO workshop on Mathematical Theory and Modeling in Atmosphere-Ocean-Science** (Oberwolfach, Germany)
“On the time scales of midlatitude atmospheric variability”
- March 22-26,
2010 **IPAM workshop on Equation Hierarchies For Climate Modeling** (UCLA)
“On the time scales of midlatitude atmospheric variability: Eddy-mean flow interactions and coupling from on high”
- July 19-24,
2009 **2009 MOCA Joint Assembly** (Montreal)
“What can Idealized GCMs Tell us About Stratosphere-Troposphere Interactions?”
- May, 24-27
2009 **2009 AGU Joint Assembly** (Toronto)
“What can Idealized GCMs Tell us About the Stratosphere and Climate Change?”
- May, 4-13
2009 **Fundamental Problems in Climate Dynamics** (Princeton NJ)
Two lectures on the stratospheric influence on tropospheric weather and climate
- April 13-18,
2008 **2008 EGU General Assembly** (Vienna)
“Intraseasonal Variability in the Midlatitudes: The Role of Stratosphere”

CONTRIBUTED PRESENTATIONS (PAST 6 YEARS)

- Oct. 22, 2019 **DynVarMIP Workshop** (Madrid, Spain) “The Response of the Jet Streams to Global Warming Across a Hierarchy of Models ”
- June 27, 2019 **22nd AMS Conference on Atmosphere and Ocean Fluid Dynamics** (Portland ME) “Revisiting the Tropopause-Jet Relationship in a Hierarchy of Atmospheric Models ”
- Oct. 1-5, 2018 **SPARC General Assembly** (Kyoto, Japan)
“The Annular Modes in reanalyses: The value of conventional and surface-observation only based reanalyses in the Northern Hemisphere”
- Aug. 27-31,
2018 **Alternative perspectives on storm tracks in a changing climate** (Utö, Stockholm, Sweden) “Volcanic eruptions: A natural case study for understanding the storm track response to external forcing”
- Oct. 23-5,
2017 **S-RIP 2017 and 13th SPARC-DA Workshop** (ECMWF, Reading, UK)
“The Annular Modes in Reanalysis” and “The strength of the diabatic circulation”
- June 26-30,
2017 **21th AMS Conf. on Atmospheric and Oceanic Fluid Dynamics** (Portland OR)
“An Idealized Multimodel Ensemble”
- Nov. 2-4,
2016 **WCRP Workshop on Model Hierarchies** (Princeton NJ)
“Untangling the tropical tropopause layer with an idealized moist model: Tropical vs. extratropical control”
- June 6-10,
2016 **4th SPARC DynVar Workshop** (Helsinki, Finland)
“A case for a new model in the hierarchy”

SEMINARS (PAST 6 YEARS)

- Feb. 9, 2021 **Imperial College, London** Atmospheric Physics Group
- Dec. 10, 2020 **The Hebrew University of Jerusalem** Institute of Earth Sciences
- Oct. 8, 2020 **Ulsan National Institute of Science & Technology** Urban and Envir. Engineering
- Jan. 31, 2020 **University of Washington** Dept. of Atmospheric Science
- April 12, 2019 **NASA GISS**
- April 5, 2019 **Columbia University** Lamont-Doherty Earth Observatory Colloquium
- Mar. 1, 2019 **Columbia University** LDEO Ocean and Climate Physics Seminar
- Feb 27, 2019 **Stanford University** Department of Earth System Science
- July 18, 2018 **ETH - Zurich** Institute for Atmospheric and Climate Science
- June 28, 2018 **NOAA Earth System Research Laboratory (Boulder CO)**
- June 8, 2017 **NOAA Earth System Research Laboratory (Boulder CO)**
- June 7, 2017 **NCAR** Atmospheric Chemistry Observations, and Modeling Laboratory
- Oct. 21, 2016 **University of Chicago** Dept. of the Geophysical Sciences
- Sept. 23, 2016 **University of Toronto** Dept. of Physics
- July 19, 2016 **GEOMAR** Ocean Circulation and Climate Dynamics Group

OUTREACH AND SEMINARS FOR GENERAL AUDIENCES

- Sept. 14, 2018 **New York University** How to be a successful graduate student
- Nov. 10, 2017 **New York University** Courant Graduate Student and Postdoc Seminar
- April 22, 2017 **March for Science Teach-in** Flash presentation on climate science
- April 26, 2014 **Courant SPLASH** Program for high school students, Keynote lecture
- May 22, 2013 **James Madison High School, Brooklyn** Math Academy
- May 1, 2013 **Risk Management Solutions** London Office
- Oct. 18, 2012 **New York University** Undergraduate Mathematics Club
- Feb. 28, 2012 **Connecticut College** Dept. of Mathematics
- Feb. 23, 2012 **New York University** Undergraduate Mathematics Club
- Sept. 28, 2011 **Max Planck Institute** IMPRS-ESM (How to be a successful graduate student)
- April 1, 2011 **New York University** Courant Graduate Student and Postdoc Seminar
- April 4, 2009 **Courant SPLASH** Program for high school students
- Dec. 4, 2008 **University of Maryland** Undergraduate Physics Club
- Feb. 23, 2007 **Columbia University** IGERT Program (How to be a successful graduate student)
- Oct. 10, 2003 **University of the South** Dept. of Mathematics