

lorenzo m. polvani

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Present Position

Maurice Ewing and J. Lamar Worzel Professor of Geophysics in the Department of Applied Physics and Applied Mathematics, Professor of Earth & Environmental Sciences, and Senior Research Scientist at the Lamont Doherty-Earth Observatory, Columbia University.

Previous Positions

- Professor of Applied Mathematics, Columbia University, 2000-2020
- Associate Professor of Applied Mathematics, Columbia University, 1995-2000
- Assistant Professor of Applied Mathematics, Columbia University, 1990-1995
- Instructor in Applied Mathematics [non-tenure track], M.I.T., 1988-1990

Education

- 1988 Ph.D., MIT/WHOI Joint Program in Physical Oceanography
Thesis Title: *Geostrophic Vortex Dynamics*
Thesis Advisors: N.J. Zabusky and G.R. Flierl
- 1982 M.Sc., McGill University, Physics
- 1981 B.Sc., McGill University, with First Class Honours in Physics

Honors & Awards

- 2019 *Elected Fellow*, American Geophysical Union
- 2016 *ATOC Distinguished Lecturer*, University of Colorado
- 2015 *Elected Fellow*, American Meteorological Society
- 2015 *Alliance Visiting Professor*, L'Ecole Polytechnique, Palaiseau (France)
- 2012 *Best Teacher of the Year*, Dept. of Earth and Environmental Sciences, Columbia
- 2008 *Great Teacher Award*, Society of Columbia Graduates
- 1997 *Distinguished Faculty Teaching Award*, Columbia SEAS Alumni Association
- 1994 NSF National *Young Investigator Award*
- 1987 *Fellow*, GTP Summer School on Geophysical and Astrophysical Turbulence, NCAR
- 1984 *Fellow*, Geophysical Fluid Dynamics Summer School, Woods Hole, MA
- 1983 *Jule G. Charney Award*, Massachusetts Institute of Technology
- 1981 Natural Science and Engineering Research Council of Canada Postgraduate Scholarship
- 1981 *Anne Molson Gold Medal* for Mathematics and Natural Philosophy, McGill University
- 1980-81 *J.W. McConnell Award*, McGill University
- 1979-81 *University Scholar*, McGill University

Professional Activities

- Member of the “Whole Atmosphere” Working Group of the MUSICA (MULTi-Scale Infrastructure for Chemistry and Aerosols) Project, National Center for Atmospheric Research, 2018–present
- Member of the Committee on Polar Meteorology and Oceanography, American Meteorological Society, 2019–present
- Member of the Scientific Steering Committee of the Community Earth System Model (CESM) Project, 2014-2020
- Review editor, Chapter 5 of UNEP/WMO Scientific Assessment of Ozone Depletion, 2018; Co-author, Chapter 4 of UNEP/WMO Scientific Assessment of Ozone Depletion, 2014; Co-author, Chapter 3 of UNEP/WMO Scientific Assessment of Ozone Depletion, 2006
- Member of the International Commission on the Middle Atmosphere (ICMA), 2011-2019
- Chair of the Committee on the Middle Atmosphere, American Meteorological Society, 2010–2012
- Chair of the Committee on Atmospheric and Oceanic Waves and Stability, American Meteorological Society, 1995–1998

Conference and Program Committees

- Member of the Organizing Committee, 2nd Model Hierarchies Workshop, Stanford, CA, August 2022
- Member of the Organizing Committee, 16th Conference on Polar Meteorology and Oceanography, Madison, WI, August 2022
- Convener of the AGU Chapman Conference on “The Width of the Tropics”, Santa Fe, NM, 2015
- Chair of the Organizing Committee, 18th Conference on the Middle Atmosphere, Newport, RI, 2013
- Member of the Organizing Committee, 16th Conference on the Middle Atmosphere, Seattle, WA, January 2011
- Chair of the “PlumbFest 2008” Symposium, Columbia University, New York, NY, October 2008
- Member of the Organizing Committee, 2002 Japanese-American Frontiers of Science Symposium, National Academy of Sciences, Irvine, CA, December 2002.
- Chair of the Organizing Committee, 12th Conference on Atmospheric and Oceanic Fluid Dynamics, Columbia University, June 1999

Visiting Positions and Appointments

- Affiliate Scientist, National Center for Atmospheric Research (CGD & ACD), 2004-present
- Alliance Visiting Professor, L'École Polytechnique, Palaiseau, April-May 2015
- Visiting Scholar, Courant Institute for Mathematical Sciences, New York University, January to June 2006
- Visiting Scientist, NOAA/Geophysical Fluid Dynamics Laboratory, Princeton NJ, July 2001 to June 2002

Courses taught, 1990 – 2022, at Columbia University

- APAM E1601 – *Introduction to Computational Physics and Math*
- APMA E3101 – *Applied Mathematics I – Linear Algebra*
- APMA E3102 – *Applied Mathematics II – Differential Equations*
- APMA E4200 – *Partial Differential Equations*
- APMA E6901 – *Special Topics in Applied Mathematics*
- APMA E8308 – *Asymptotic Methods in Applied Mathematics*
- APAM E9810 – *Mathematical Earth Science Seminar*
- APAM E4210 – *Geophysical Fluid Dynamics*
- EESC E4008 – *Introduction to Atmospheric Science*

Graduate Students Advised

James Cho	Thesis title: Geophysical turbulence in shallow water with applications to planetary atmospheres. Graduation date: September 1996
Mark DiBattista	Thesis title: Vortex pairs in spherical geometry as models of atmospheric blocking. Graduation date: December 1996
Allen Kuo	Thesis title: Nonlinear geostrophic adjustment and wave-vortex interactions in in rotating shallow water. Graduation date: May 1999
Leonard Rivier	Thesis title: Jet formation and equatorial superrotation in Jupiter’s atmosphere: numerical modeling using a new efficient parallel code Graduation date: August 2001 moist Hadley circulation. Graduation date: August 2005
Matthew Wittman	Thesis title: Stratospheric influences on baroclinic lifecycles Graduation date: August 2006
Clara Orbe	Thesis title: Tracer-independent approaches to stratosphere-troposphere exchange and tropospheric air mass composition. Graduation date: April 2013
Neil Tandon	Thesis title: What is driving changes in the tropospheric circulation? New insights from simplified models. Graduation date: May 2013
Bernard Lipat	Thesis title: Quantifying and understanding the linkages between clouds and the general circulation of the atmosphere. Graduation date: May 2018.
Mark England	Thesis title: Understanding Observed and Projected Climate Changes in the Antarctic, and their Global Impacts. Graduation date: May 2019.
Jessie Oehrlein	Thesis title: Sudden Stratospheric Warmings and Their Impact on Northern Hemisphere Winter Climate. Graduation date: April 2021.
Tyler Janoski	advised since Fall 2017; expected to graduate Summer 2023
Ivan Mitevski	advised since Fall 2018; expected to graduate Summer 2023
Dana Raiter	advised since Fall 2020; expected to graduate Summer 2024
Paulina Czarnecki	advised since Fall 2021; expected to graduate Summer 2025

Post-doctoral Fellows Advised

Gavin Esler	1996–1998	now Professor at University College London
Richard Scott	2001–2003	now Professor at St. Andrew's University
Andrew Charlton	2004–2006	now Professor at the University of Reading
Edwin Gerber	2006–2008	now Professor at New York University
Seok-woo Son	2006–2008	now Professor at Seoul National University
Sarah Kang	2009–2011	now Professor at Ulsan National Inst. of Science & Technology
Shuguang Wang	2009–2012	now Research Scientist at Columbia University
Jimmy Booth	2010–2013	now Professor at the City University of New York
Harald Rieder	2011–2013	now Professor at BOKU University in Vienna, Austria
Elizabeth Barnes	2012–2013	now Professor at Colorado State University
Karen Smith	2011–2017	now Professor at the University of Toronto
Kevin Grise	2012–2014	now Professor at the University of Virginia
Abraham Solomon	2014–2016	now Math Teacher at the YDE School in Brooklyn, NY
Gabriel Chiodo	2014–2018	now Senior Research Scientist at ETH (Zurich)
Aditi Sheshadri	2015–2017	now Professor at Stanford University
Katinka Bellomo	2015–2017	now Scientist with the Italian National Research Council
Antara Banerjee	2015–2018	now CIRES Postdoctoral Fellow at NOAA, Boulder
Rei Chemke	2017–2020	now Professor at the Weizmann Institute, Israel
Bithi De	2019–	(current)
Kevin DallaSanta	2019–	(current)
Yu-Chiao Liang	2020–	(current)
Zachary McGraw	2021–	(current)
Yue Dong	2022–	(current)

Undergraduate Research Students Advised

Serge Voronin	2005–2007	went on in graduate school, Princeton University
Damian Ancukiewicz	2007–2008	went on to graduate school at UCSD
Ana Lobo	2014–2015	went on to graduate school at Cal tech

Academic Service

- Vice-chair, Department of Applied Physics and Applied Mathematics (2019-present)
- Faculty Advisor for the Applied Mathematics Graduate & Undergraduate Programs
- Faculty Advisor, TBII (Engineering Honor Society), Columbia Chapter, 2001-2012
- Faculty Advisor, Engineers Without Borders, Columbia Chapter, 2006-2009
- Faculty representative in the University Senate (2 rounds of three years)
- Innumerable other committees, surely not worth my listing or your reading...

Membership in Professional Societies

- American Meteorological Society
- American Physical Society
- European Geosciences Union
- $\Sigma\Xi$ (The Scientific Research Society)
- American Geophysical Union
- American Astronomical Society
- Society for Industrial & Applied Mathematics

Conference attendance, with research presentations (last decade only)

- 16th Annual CESM Workshop, Breckenridge, CO (June 2011) [INVITED TALK]
- WCRP Open Science Conference, Denver CO (October 2011) [INVITED TALK]
- AGU General Assembly, San Francisco, CA (December 2011)
- EGU General Assembly, Vienna, Austria (April 2012)
- AGU General Assembly, San Francisco, CA (December 2012)
- The MIT Southern Ocean Workshop, Cambridge, MA (January 2013) [INVITED TALK]
- EGU General Assembly, Vienna, Austria (April 2013)
- 17th AMS Conference on the Middle Atmosphere, Newport, RI (June 2013)
- Davos Atmosphere and Cryosphere Assembly, Davos, CH (July 2013) [INVITED TALK]
- AGU General Assembly, San Francisco, CA (December 2013) [INVITED TALK]
- “Connecting the Tropics to Polar Regions” Conference, NY, NY (June 2014) [INVITED TALK]
- AGU General Assembly, San Francisco, CA (December 2014)
- Chapman Conference on “The Width of the Tropics”, Santa Fe, NM (July 2015)
- AGU General Assembly, San Francisco, CA (December 2015)
- UW Friday Harbor Summer Workshop, Seattle, WA (September 2016) [INVITED TALK]
- WCRP Model Hierarchies Workshop, Princeton, NJ (November 2016)
- AGU General Assembly, San Francisco, CA (December 2016)
- EGU General Assembly, Vienna, Austria (April 2017) [INVITED TALK]
- AGCI Workshop on Polar Amplification, Aspen, CO (June 2017) [INVITED TALK]
- AGU General Assembly, New Orleans, CA (December 2017)
- EGU General Assembly, Vienna, Austria (April 2018) [INVITED TALK]
- SPARC 6th General Assembly, Kyoto, Japan (October 2018) [INVITED TALK]
- AGU General Assembly, Washington, DC (December 2018)
- 18th AMS Conference on the Middle Atmosphere, Phoenix, AZ (January 2019)
- 15th AMS Conference on Polar Meteorology and Oceanography, Boulder, CO (May, 2019)
- AGU General Assembly, San Francisco, CA (December 2019) [INVITED TALK]
- EGU General Assembly (virtual, May 2020)
- AGU General Assembly (virtual, December 2020)
- EGU General Assembly (virtual, April/May 2021)
- AGU General Assembly, New Orleans LA (hybrid, December 2021)

1. Peer-reviewed journal articles:**2022**

227. R. Chemke, L. Zanna, C. Orbe, L. Sentman and L.M. Polvani (2022): **The future intensification of the North Atlantic winter storm track: the key role of dynamic ocean coupling**, *J. Climate* **35**, 2407–2421
226. S. Hay, P.J. Kushner, R. Blackport, K.E. McCusker, T. Oudar, L. Sun, M. England, C. Deser, J.A. Screen and L.M. Polvani (2022): **Separating the influences of low-latitude warming and sea-ice loss on Northern Hemisphere climate change**, *J. Climate* **35**, 2327–2349
225. I. Mitevski, L.M. Polvani and C. Orbe (2022): **Asymmetric warming/cooling response to CO₂ increase/decrease due to non-logarithmic forcing, not feedbacks**, *Geophys. Res. Lett.* **23**, e2021GL097133
224. A. Scaife and 19 co-authors (including L.M. Polvani) (2022): **Long Range Prediction and the Stratosphere**, *Atoms. Chem. Phys.* **22**,
223. Y-C. Liang, L.M. Polvani and I. Mitevski (2022): **Arctic amplification, and its seasonal migration, over a wide range of abrupt CO₂ forcing**, *npj Clim. Atmos. Sci.* **5**:14
222. Y-C. Liang, L.M. Polvani, M. Previdi, K.L. Smith, M.R. England and G. Chiodo (2022): **Stronger Arctic Amplification from Ozone-Depleting Substances than from Carbon Dioxide**, *Environ. Res. Lett.* **17**:024010

2021

221. J. Oehrlein, L.M. Polvani, L. Sun and C. Deser (2021): **How well do we know the surface impact of sudden stratospheric warmings?** *Geophys. Res. Lett.* **48**, 22, e2021GL095493
220. B. De, G. Tselioudis and L.M. Polvani (2021): **Improved representation of atmospheric dynamics in CMIP6 models removes climate sensitivity dependence on Hadley Cell climatological extent**, *Atmos. Sci. Lett.* **22**:e1073
219. L.M. Polvani, A. Banerjee, R. Chemke, E.W. Doddridge, D.Ferreira, A. Gnanadesikan, M.A. Holland, Y. Kostov, J. Marshall, W.J.M. Seviour, S. Solomon, and D.W. Waugh (2021): **Interannual SAM modulation of Antarctic sea ice extent does not account for its long-term trends, pointing to a limited role for ozone depletion**, *Geophys. Res. Lett.* **48**, 21, e2021GL094871
218. M. Previdi, K.L. Smith and L.M. Polvani (2021): **Arctic amplification of climate change: A review of underlying mechanisms**, *Environ. Res. Lett.* **16**:093003
217. R. Chemke, L.M. Polvani, J. Kay and C. Orbe, 2021: **Quantifying the role of ocean coupling in Arctic amplification and sea-ice loss over the 21st century**, *npj Clim. Atmos. Sci.* **4**, 46
216. K.L. Smith and L.M. Polvani, 2021: **Modeling evidence for a large, ENSO-driven, interannual, wintertime AMOC variability**, *Environ. Res. Lett.* **16**:084038
215. P. Pisoft, P. Sacha, L.M. Polvani, and 11 co-authors, 2021: **Stratospheric contraction caused by increasing greenhouse gases**, *Environ. Res. Lett.* **16**:064038
214. A. Banerjee, A.H. Butler, L.M. Polvani, A. Robock, I.R. Simpson and L. Sun, 2021: **Robust winter warming over Eurasia under stratospheric sulfate geoengineering - the role of stratospheric dynamics** **21**, 6985-6997

213. I. Mitevski, C. Orbe, R. Chemke, L. Nazarenko and L.M. Polvani, 2021: **Non-monotonic response of the climate system to abrupt CO₂ forcing**, *Geophys. Res. Lett.* **48**, e2020GL090861
212. R. Chemke and L.M. Polvani, 2021: **Elucidating the mechanisms responsible for Hadley cell weakening under 4×CO₂ forcing**, *Geophys. Res. Lett.* **48**, e2020GL090348

2020

211. R. Chemke, M. Previdi, M.R. England and L.M. Polvani, 2020: **Distinguishing the impacts of ozone and ozone depleting substances on the recent increase in Antarctic surface mass balance**, *The Cryosphere* **14**, 4135-4144
210. L.M. Polvani and S.J. Camargo, 2020: **Scant evidence for a volcanically forced winter warming over Eurasia following the Krakatau eruption of August 1883**, *Atmos. Chem. Phys.* **20**, 13687–13700
209. D.M. Mitchell, Y.T. Lo, W.J.M. Seviour, L. Haimberger and L.M. Polvani, 2020: **The vertical profile of recent tropical temperature trends: Persistent model biases in the context of internal variability**, *Environ. Sci. Lett.*, **15**:1040b4
208. H.A. Singh and L.M. Polvani, 2020: **Low Antarctic climate sensitivity due to high ice sheet orography**, *npj Climate and Atmospheric Science*, **3**, 39
207. M.R. England, L.M. Polvani, L. Sun, 2020: **Robust Arctic warming caused by projected Antarctic sea ice loss**, *Environ. Res. Lett.* **15**:104005
206. J. Oehrlein, G. Chiodo and L.M. Polvani, 2020: **The effect of interactive ozone chemistry on weak and strong stratospheric polar vortex events**, *Atmos. Chem. Phys.* **20**, 10531-10544
205. D.W. Waugh, A. Banerjee, J.C. Fyfe and L.M. Polvani, 2020: **Contrasting recent trends in Southern Hemisphere Westerlies across different ocean basins**, *Geophys. Res. Lett.* **47**, 18, e2020GL088890
204. M. Previdi, T. Janoski, G. Chiodo, K.L. Smith and L.M. Polvani, 2020: **Arctic amplification as a rapid adjustment to increased CO₂**, *Geophys. Res. Lett.* **47**, 17, e2020GL089933
203. B. De, Y. Wu and L.M. Polvani, 2020: **Non-additivity of the mid-latitude circulation response to regional Arctic temperature anomalies: the role of the stratosphere**, *Geophys. Res. Lett.* **47**, 16, e2020GL088057
202. R. Chemke and L.M. Polvani, 2020: **Using multiple large ensembles to elucidate the discrepancy between the 1979-2019 modeled and observed Antarctic sea-ice trends**, *Geophys. Res. Lett.* **47**, 16, e2020GL088057
201. A. Steiner and 18 co-authors (including L.M. Polvani), 2020: **Observed temperature changes in the troposphere and stratosphere from 1979 to 2018**, *J. Climate* **33**, 8165-8194
200. B. Ayarzagüena and 20 co-authors (including L.M. Polvani), 2020: **Uncertainty in the response of stratospheric sudden warmings and stratosphere-troposphere coupling to quadrupled CO₂ concentrations in CMIP6 models**, *J. Geophys. Res.* **126**, 6, e2019JD032345
199. M.R. England, L.M. Polvani, L. Sun and C. Deser, 2020: **Tropical climate responses to projected Arctic and Antarctic sea ice loss**, *Nature Geoscience* **13**, 275-281

198. A. Banerjee, J.C. Fyfe, L.M. Polvani, D.W. Waugh and K.-L. Chang, 2020: **A pause in Southern Hemisphere circulation trends due to the Montreal Protocol**, *Nature* **579**, 544-548
197. R. Chemke, L.M. Polvani and L. Zanna, 2020: **Human influence on North Atlantic surface temperature**, *Nature Comm.***11**:1540
196. R. Chemke and L.M. Polvani, 2020: **Linking midlatitudes eddy heat flux trends and polar amplification**, *npj Clim. Atmos. Sci.* **3**, 8
195. L.M. Polvani, M. Previdi, M.R. England, G. Chiodo and K.L. Smith, 2020: **Substantial twentieth-century Arctic warming caused by ozone depleting substances**, *Nature Climate Change* **10**, 130-133
194. G. Danabasoglu and 42 co-authors (including L.M. Polvani), 2020: **The Community Earth System Model version 2 (CESM2)**, *J. Adv. Model. Earth. Syst.* **12**, 2, e2019MS001916

2019

193. H. Singh, L.M. Polvani and P.J. Rasch, 2019: **Antarctic sea ice expansion, driven by internal variability, in the presence of** **46**, 14,762–14,771
192. A. Gettelman and 23 co-authors (including L.M. Polvani), 2019: **The Whole Atmosphere Community Climate Model Version 6 (WACCM6)**, *J. Geophys. Res.* **124**, 12380–12403
191. G. Chiodo and L.M. Polvani, 2019: **The response of the ozone layer to quadrupled CO₂ concentrations: Implications for climate**, *J. Climate* **32**, 7639–7642
190. A. Banerjee, G. Chiodo, M. Previdi, M. Ponater, A.J. Conley and L.M. Polvani, 2019: **Stratospheric water vapor: an important climate feedback**, *Clim. Dyn.* **53**, 1697–1710
189. W.J.M. Seviour, F. Codron, E.W. Doddridge, D.Ferreira, A. Gnanadesikan, Y. Kostov, J. Marshall, L.M. Polvani, J.L. Thomas and D.W. Waugh, 2019: **The Southern Ocean sea surface temperature response to ozone depletion: A multi-model comparison**, *J. Climate* **32**, 5107–5121
188. L.M. Polvani, L. Wang, M. Abalos and CCMi co-authors, 2019: **Large impacts, past and future, of ozone-depleting substances on Brewer-Dobson circulation trends: A multi-model assessment**, *J. Geophys. Res.* **124**, 6669–6680
187. R. Chemke and L.M. Polvani, 2019: **Opposite tropical circulation trends in climate models and in reanalyses**, *Nature Geoscience* **12**, 528–532
186. M. England, A. Jahn and L.M. Polvani, 2019: **Non-uniform contribution of internal variability to recent Arctic sea ice loss**, *J. Climate.* **32**, 4039–4053
185. J. Oehrlein, G. Chiodo and L.M. Polvani, 2019: **Separating and quantifying the distinct impacts of El Niño and stratospheric sudden warmings on North Atlantic and Eurasian wintertime climate**, *Atmos. Sci. Lett.* **20**:e923
184. S.J. Camargo and L.M. Polvani, 2019: **Little evidence of reduced global tropical cyclone activity following volcanic eruption**, *npj Clim. Atmos. Sci.* **2**:14
183. L.M. Polvani, A. Banerjee, A. Schmidt, 2019: **Northern Hemisphere continental winter warming the following the 1991 Mt. Pinatubo eruption: Reconciling models and observations**, *Atmos. Chem. Phys.* **19**, 6351–6366

182. H.E. Rieder, G. Chiodo, J. Fritzer, C. Wienerroither and L.M. Polvani, 2019: **Is interactive ozone chemistry important to represent polar cap stratospheric temperature variability in Earth-System Models?** *Environ. Res. Lett.* **14**:044026
181. M. Abalos, L.M. Polvani, N. Calvo, D. Kinnison, F. Ploeger and S. Solomon, 2019: **New insights on the impact of ozone depleting substances on the Brewer-Dobson circulation,** *J. Geophys. Res.* **124**, 2435–2451
180. L.M. Polvani and K. Bellomo, 2019: **The key role of ozone depleting substances in weakening the Walker circulation in the second half of the 20th century,** *J. Climate* **32**, 1411–1418
179. R. Chemke, L.M. Polvani and C. Deser, 2019: **The effect of Arctic sea-ice loss on the Hadley circulation,** *Geophys. Res. Lett.* **46**, 963–972
178. G. Chiodo, J. Oehrlein, L.M. Polvani, J. Fyfe and A.K. Smith, 2019: **Insignificant influence of the 11-year solar cycle on the North Atlantic Oscillation,** *Nature Geoscience* **12**, 1411–1418
177. R. Chemke and L.M. Polvani, 2019: **Exploiting the abrupt 4×CO₂ scenario to elucidate tropical expansion mechanisms,** *J. Climate* **32**, 859–875

2018

176. B.R. Lipat, A. Voigt, G. Tselioudis and L.M. Polvani, 2018: **Model uncertainty in cloud-circulation coupling, and cloud-radiative response to increasing CO₂, linked to biases in the climatological circulation,** *J. Climate* **31**, 10013–10020
175. R. Chemke and L.M. Polvani, 2018: **Ocean circulation reduces the Hadley cell response to increased greenhouse gases,** *Geophys. Res. Lett.* **45**, 9197–9205
174. K.L. Smith, L.M. Polvani and L.B. Tremblay, 2018: **The Impact of Stratospheric Circulation Extremes on Minimum Arctic Sea Ice Extent,** *J. Climate* **31**, 7169–7183
173. B. Ayarzagüena, L.M. Polvani, U. Langematz, and CCMI co-authors, 2018: **No Robust Evidence of Future Changes in Major Stratospheric Sudden Warmings: A Multi-model Assessment from CCMI,** *Atmos. Chem. Phys.* **18**, 11277–11287
172. M. England, L. Sun and L.M. Polvani, 2018: **Contrasting the Antarctic and Arctic atmospheric responses to projected sea ice loss in the late 21st Century,** *J. Climate* **31**, 6353–6370
171. K. Bellomo, L.N. Murphy, M.A. Cane, A.C. Clement and L.M. Polvani, 2018: **Historical Forcings as Main Drivers of the Atlantic Multidecadal Oscillation in the CESM Large Ensemble,** *Clim. Dyn.* **50**, 3687–3698
170. G. Chiodo, L.M. Polvani and co-authors, 2018: **The response of the ozone layer to quadrupled CO₂ concentrations,** *J. Climate* **31**, 3893–3907
169. L. Zhang K. Karnauskas, J.B. Weiss and L.M. Polvani, 2018: **Observational evidence of the downstream impact on tropical rainfall from stratospheric Kelvin waves,** *Clim. Dyn.* **50**, 3775–3782
168. L.M. Polvani, M. Abalos, R. Garcia, D. Kinnison and W.J. Randel, 2018: **Significant weakening of Brewer-Dobson circulation trends over the 21st century as a consequence of the Montreal Protocol,** *Geophys. Res. Lett.* **45**, 401–409

167. K.L. Smith, G.Chiodo, M. Previdi and L.M. Polvani, 2018: **No surface cooling over Antarctica from the negative greenhouse effect associated with instantaneous quadrupling of CO₂ concentrations**, *J. Climate* **31**, 317–323

2017

166. L. Landrum, M. Holland, M. Raphael, and L.M. Polvani, 2017: **Stratospheric ozone depletion: an unlikely driver of the regional trends in Antarctic sea ice in austral fall in the late 20 th Century**, *Geophys. Res. Lett.* **44**, 11062–11070
165. W.J. Randel, L.M. Polvani, F. Wu, D.E. Kinnison, C-Z. Zou and C. Mears, 2017: **Troposphere-stratosphere temperature trends derived from satellite data compared with ensemble simulations from WACCM**, *J. Geophys. Res.* **122**, 9651–9667
164. K.M. Grise and L.M. Polvani, 2017: **Understanding the timescales of the tropospheric circulation response to abrupt CO₂ forcing in the Southern Hemisphere: Seasonality and the role of the stratosphere**, *J. Climate* **30**, 8497–8515
163. M. Previdi and L.M. Polvani, 2017: **Impact of the Montreal Protocol on Antarctic Surface Mass Balance and Implications for Global Sea-Level Rise**, *J. Climate* **30**, 7247–7253
162. P. Lin, D. Paynter, L.M. Polvani, G.J.P. Correa, Y. Ming and V. Ramaswamy, 2017: **Dependence of model-simulated response to ozone depletion on stratospheric polar vortex climatology**, *Geophys. Res. Lett.* **44**, 6391–6398
161. Y. Wu and L.M. Polvani, 2017: **Recent Trends in Extreme Precipitation and Temperature over Southeastern South America: The Dominant Role of Stratospheric Ozone Depletion**, *J. Climate* **30**, 6433–6441
160. B.R. Lipat, G. Tselioudis, K.M. Grise and L.M. Polvani, 2017: **CMIP5 models' climate sensitivity linked to the climatological Hadley cell extent**, *Geophys. Res. Lett.* **44**, 5739–5748
159. G. Chiodo, L.M. Polvani and M. Previdi, 2017: **Large increase in incident shortwave radiation due to the ozone hole offset by high climatological albedo over Antarctica**, *J. Climate* **30**, 4883–4890
158. W.J.M. Seviour, D.W. Waugh, L.M. Polvani, G.J.P. Correa and C.I. Garfinkel, 2017: **Robustness of the simulated tropospheric response to ozone depletion**, *J. Climate* **30**, 2577–2585
157. L.M. Polvani, L. Wang, V. Aquila and D.W. Waugh, 2017: **The impact of ozone depleting substances on tropical upwelling, as revealed by the absence of lower stratospheric cooling since the late 1990s**, *J. Climate* **30**, 2523–2534
156. L.M. Polvani, L. Sun, A.H. Butler, J.H. Richter and C. Deser, 2017: **Distinguishing stratospheric sudden warmings from ENSO as key drivers of wintertime climate variability over the North Atlantic and Eurasia**, *J. Climate* **30**, 1959–1969
155. A. Banerjee, L.M. Polvani and JC Fyfe, 2017: **The United States "warming hole": quantifying the forced aerosol response given large internal variability**, *Geophys. Res. Lett.*, **44**, 1928–1937
154. G. Chiodo and L.M. Polvani, 2017: **Reduced Southern Hemispheric circulation response to quadrupled CO₂ due to stratospheric ozone feedback**, *Geophys. Res. Lett.* **44**, 465–474

153. K.L. Smith and L.M. Polvani, 2017: **Spatial patterns of recent Antarctic surface temperature trends and the importance of natural variability: Lessons from multiple reconstructions and the CMIP5 models**, *Clim. Dyn.* **48**, 2653–2670

2016

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