

Curriculum Vitae

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1. Education:

Leadership Academy , NCAR/UCAR, Boulder CO	2019
Graduate Certificate in Instructional Design , University of Wisconsin, Menomonie, WI	2015
Ph.D. Atmospheric Sciences , University of Washington, Seattle, WA	2002
<ul style="list-style-type: none">• Advisors: Dr. James Holton, Dr. M. Joan Alexander• Thesis: "Gravity waves generated by tropical convection: generation mechanisms and implications for global circulation models"	
B.S. Mathematics , State University of New York, Purchase, NY	1997

2. Work History:

Scientist III , CGD, National Center for Atmospheric Research (NCAR), Boulder, CO	2017 - present
Project Scientist II , CGD, National Center for Atmospheric Research (NCAR), Boulder, CO	2013 - 2017
Scientist II , CGD, National Center for Atmospheric Research, Boulder, CO	2009 - 2012
Scientist I , CGD, National Center for Atmospheric Research, Boulder, CO	2006 - 2009
Education and Outreach Visiting Fellow , CIRES, University of Colorado, Boulder, CO	2005 - 2006
Visitor , ACD, National Center for Atmospheric Research, Boulder, CO	2005
ASP Postdoctoral Scientist , Joint appointment between HAO/CGD/ACD National Center for Atmospheric Research, Boulder, CO	2002 - 2005
Field Project Participant , Convection and Moisture Experiment 4, Jacksonville, FL	2001
<ul style="list-style-type: none">• Operated an instrument on the NASA ER-2 and DC-8 aircrafts	
Scientist , Young Scientists Summer Program, International Institute for Applied Systems Analysis, Laxenburg, Austria	2000
<ul style="list-style-type: none">• Researched climate change and hurricane activity for policy makers	
Research Assistant , University of Washington, Seattle, WA	1997 - 2002
<ul style="list-style-type: none">• Modeled convection and gravity waves using a mesoscale model	
Research Assistant , State University of New York, Purchase, NY	1997
<ul style="list-style-type: none">• Analyzed turbulence data from British Airways flights	

3. Scientific Accomplishments:

3.1 Contributions to Community Models:

[7] Contributed to the development of a high vertical resolution/high top version of CAM	2020
[6] Developed a high vertical resolution version of WACCM in order for WACCM/NCAR to participate in the quasi-biennial oscillation intercomparison (QBOi) project. Leads NCAR's contribution to QBOi.	2015 - 2018
[5] Led the transition from the 2x2.5° to the 0.9x1.25° version of the Whole Atmosphere Community Climate Model (WACCM), version 5. Improved the gravity wave parameterization to obtain an internally generated quasi-biennial oscillation. Publication [31]	2015
[4] Developed a version of Community Atmosphere Model (CAM) with a raised model lid and a realistic representation of sudden stratospheric warmings and internally generated quasi-biennial oscillation. Publications [27, 30]. This version of model will be thoroughly tested and given to the community as a subseasonal forecasting model per funded grant [4].	2014 - 2015
[3] Changed the entire non-orographic gravity wave source representation in WACCM from an arbitrary to a physically based parameterization. Publication [15]	2009 - 2010
[2] Added convective momentum transport parameterization to the convection parameterization in CAM, which resulted in a very large improvement in the representation of the El Nino Southern Oscillation. Publications [12, 13]	2005 - 2006
[1] Changed the convective gravity wave source representation in WACCM from an arbitrary to a physically based representation. Publication [7]	2004 - 2005

3.2 Major Scientific Advances:

[4] Pioneered the development of a subseasonal prediction system with CESM1, CESM2, and CESM2 WACCM, including the capability for near real-time forecasting.	2016 - 2020
[3] Led a team effort on examining the role of stratospheric SO ₂ injections on climate. Project resulted in the demonstration that surface temperatures in WACCM can be kept at 2020 levels (despite greenhouse gas emissions) using SO ₂ injections into the stratosphere at four different locations. Publications [32, 33, 34, 35, 36]	2015 - 2017
[2] Demonstrated that with improvements to the gravity wave parameterization and increased vertical resolution, a realistic quasi-biennial oscillation can be obtained in CAM. Publications [24, 25]	2013 - 2014
[1] Used linear theory and mesoscale simulations to describe and quantify the relationships between gravity wave properties and convection properties. Developed the first source spectrum parameterization for convectively generated gravity waves. Publications [2, 3, 4, 5]	2001 - 2004

4. Community Service:

4.1 Student Mentorship

[7] Graduate Student Mentor for Todd Rhodes, Coastal Carolina University	2016
[6] Graduate Student Mentor for Oliver Watt-Meyer, University of Toronto	2015
[5] Graduate Student Mentor for Junhong Wei, Pennsylvania State University	2015
[4] Undergraduate Student Mentor for Andre Hernandez-Espiet, U. Metropolitana	2015
[3] Graduate Student Mentor for Weiye Yao, University of Michigan	2014
[2] Graduate Student Mentor for Alex Hassiotis, visitor from Pennsylvania State U.	2006
[1] Undergraduate Student Mentor , SOARS student	2003

4.2 Thesis Committees

[3] Ph.D Thesis Committee Member for Todd Rhodes, Coastal Carolina University	2020-2021
[2] Ph.D. Thesis Committee Member for Weiye Yao, University of Michigan	2014
[1] Ph.D. Thesis Committee Member for Amir Sayed, Carleton University	2014

4.3 Education and Outreach

Science Mentor , Earth Explorers, Westview Middle School	2019 - 2020
Lead organizer , NCAR Explorer Series	2015 - 2017
<ul style="list-style-type: none">• Develops vision for and ensures success of all events• Coordinates efforts between 30 team members from NCAR & UCAR	
Coordinator , CGD/NCAR Education and Outreach Activities	2015 - present
<ul style="list-style-type: none">• Contributes to education and outreach strategic planning for NCAR• Develops concept of CESM viewer for undergraduate and teacher education• Fosters collaborations related to climate education and outreach with Universities and other education and outreach groups at NCAR/UCAR	
Participant , 2-day Science: Becoming the Messenger Workshop	2014
<ul style="list-style-type: none">• Learnt about effective communication to a lay audience• Practiced on-camera interviews and presentations with professional feedback	
Volunteer Climate Educator , Climate Reality Project	2013 - Present
<ul style="list-style-type: none">• Presenter of a climate change education lecture to diverse audiences	
Participant , Climate Reality Leadership Corps Training with former Vice President Al Gore, Chicago, IL	2013
Keynote Speaker , "Climate and Weather: The Two Go Together", National Center for Atmospheric Research, Boulder, CO	2006
Education and Outreach Program Designer , CIRES, University of Colorado, Boulder, CO	2005 - 2006

- “WeatherWise” badge program and kit designer for Girl Scouts
 - “WeatherWise” program testing and implementation
 - “Radiosonde Launch” film design, production and editing
- Education and Outreach Program Designer**, ASP, NCAR 2005
- Created and developed “Climate and Weather: The Two Go Together”, Girls Scouts at the National Center for Atmospheric Research (NCAR) program
 - Program invites Girl Scouts to NCAR twice a year for a day of immersion into atmospheric science and atmospheric science careers
 - Program now in it’s 8th year
- Mentor**, Building Bridges in Education Conference 2004
- Content Editor**, NASA Astroventure program 2004
- Content editing of web-based E&O materials for NASA
- Role Model**, NASA Astroventure program 2004
- Interviewed and profiled for NASA website to inspire girls to pursue a science career
- Online Teacher**, National Teachers Enhancement Network 2004 - 2005
- Developed and taught a 15-week online course: “Weather and Climate for Teachers”
- Participant**, 4-day “Education Workshop for Scientists, Engineers and EPO managers” 2003
Space Science Institute, Boulder, CO
- Learned about effective strategies for involvement of scientists in education and outreach activities
 - Developed a better understanding of the ‘bridging the educational gap’ problem
 - Connected with E&O Program Managers across the US
- Outreach Coordinator**, Department of Atmospheric Sciences, University of Washington, Seattle, WA 2000 - 2001
- Managed department outreach activities to meet the needs of local middle schools
 - Organized department tours, demos, and coordinated outreach volunteer participation
- Outreach Volunteer**, Department of Atmospheric Science, University of Washington, Seattle, WA 1998 - 1999
- Performed science demonstrations at middle school science fairs
 - Taught atmospheric science on science days in middle-schools
 - Introduced kids to atmospheric science through department tours and simple demonstrations
- Lead Teaching Assistant**, Department of Atmospheric Sciences, University of Washington, Seattle, WA 2000 - 2002
- Managed 12 to 15 teaching assistants
 - Supervised classroom visits, developed labs and activities for “Weather 101”

4.4 Science Community Service:

Co-Chair , CESM Earth System Prediction Working Group (ESPWG)	2020 - present
Member , CAM vertical resolution grid taskforce	2020 - 2021
Member , NCAR NWSC-3 SRAP Committee	2020
Member , NCAR COVID-19 Task Team	2020
Member , NCAR response to RFI on Earth System Predictability Committee	2020
Local Host , SPARC Scientific Steering Group Meeting	2019
Co-founder and Scientific Steering Group Member , Geoengineering Modeling Research Consortium	2019 - present
Co-lead , NCAR/CGD Earth System Prediction Theme	2019 - present
Member , NCAR Strategic Planning Committee	2019
Member , International Commission of the Middle Atmosphere (ICMA)	2019 - present
Associate Editor , Journal of the Atmospheric Sciences	2019 - present
Member , Science Advisory Panel (SRAP) for the NCAR/CISL NWSC-3 Procurement	2018 - present
Co-Lead , NCAR/UCAR Innovation Council	2017 - present
Developer , Community Atmosphere Model, Community Earth System Model	2005 - present
Developer , Whole Atmosphere Community Climate Model	2003 - present
Reviewer , Journal of the Atmospheric Sciences, Journal of Geophysical Research, Geophysical Research Letters, Bulletin of the American Meteorological Society, Climate Dynamics, Journal of Solar and Terrestrial Physics	2002 - present
Program Committee Member , 2016 SPARC Gravity Wave Symposium	2015
Co-Chair , Climate and Weather of the Sun-Earth System Working Group	2011 - 2012
• Coordinated research efforts between international group of gravity wave scientists	
Session Organizer , Annual American Geophysical Union Meeting	2006
Retreat Organizer , TIIMES, National Center for Atmospheric Research, Boulder, CO	2006
• Organized a week-long gravity wave retreat consisting of 30 international gravity wave experts	
• Led the effort of putting together a white paper following the retreat	

5. Honors and Awards:

Scientific and Technological Activities Commission Distinguished Scientific/Technological Accomplishment Award , American Meteorological Society	2021
Best Student Paper , American Meteorological Society Annual Meeting	2000
Irene P. Goldring Award , State University of New York at Purchase, Purchase NY	1997
• In recognition of a graduating woman who has demonstrated promise for a career in science or mathematic	
Best Student Research Project , State University of New York at Purchase, Purchase, NY	1997

6. Proposals and Grants

[14] SilverLining NGO , PI: Small ensemble of climate intervention simulations using stratospheric aerosols, \$50,000	2021- 2022
[13] UCAR , PI: Towards actionable science: assessment of water availability under climate change and climate intervention scenarios, \$161,684	2021 - 2022
[12] NOAA , Co-PI: Marine cloud brightening as a climate intervention strategy simulated by Community Earth System Model version 2, \$250,000	2021 - 2023
[11] SilverLining NGO , PI: Impact of climate intervention using stratospheric aerosols on weather extremes, \$467,000	2021 - 2023
[10] NSF , Collaborator: What are the fundamental limits/trade-offs of stratospheric aerosol geoengineering? PI: Douglas G. MacMartin	2020 - 2022
[11] DOE , Co-PI: Cooperative Agreement for To Analyze variability, change and predictability in the earth System (CATALYST), PI: Gerald Meehl, 10M	2019 - 2021
[9] NOAA , Co-I: Benefits of stochastic parameterization on the sub seasonal and seasonal timescales in hindcasts with CESM and UFS; PI: J. Berner, \$860,000	2019 - 2022
[8] DOE , PI: Improving Momentum Transport Processes in E3SM Co-PIs: M. Moncrieff (NCAR) and S. Xie (LLNL), \$1,050,000	2018 - 2021
[7] NOAA , PI: Subseasonal to Seasonal Prediction with NCAR's CESM2-WACCM Co-PIs: J. Perlwitz (NOAA-ESRL) and D. Collins (NOAA-CPC), \$340,000	2018 - 2020
[6] NSF , Collaborator: EAGER: Introducing a design element into stratospheric aerosol geoengineering, PI: Douglas G. MacMartin	2018 - 2020
[5] DARPA , PI: Building confidence in an intelligently-designed climate intervention strategy. Co-PI: S. Tilmes (NCAR), \$240,000	2017
[4] NOAA , Co-PI: Role of stratospheric processes in predicting ENSO-NAO connections on subseasonal timescale. PI: J. Perlwitz (NOAA-ESRL), Co-I's: J. Bacmeister (NCAR) and L. Sun (NOAA-ESRL), \$508,505	2016 - 2018
[3] DARPA , PI: A Holistic Assessment of Injection of SO ₂ into the Stratosphere, Co-PI: S. Tilmes (NCAR), \$400,000	2015 - 2016
[2] NSF , Collaborator, Examining the Connections between Observed Atmospheric Gravity Waves and Convective Clouds for Improved Climate Simulations, PI: M. Joan Alexander (CoRA)	2014 - 2017
[1] NASA , Co-I: Improving gravity wave parameterizations for next generation of troposphere/middle atmosphere general circulation models. Co-investigators: J. Bacmeister (NASA GODDARD), S. Eckermann (NRL), \$500,000	2006 - 2009

7. Publications List

7.1 Thesis

Beres, J. H., 2002. Gravity waves generated by tropical convection: generation mechanisms and implications for global circulation models. Ph.D. thesis Dept. of Atmospheric Science, University of Washington, 129 pp.

7.2 Book Chapters

[1] **Richter, J. H.**, M. J. Alexander, J. T. Bacmeister, C. Heale, C. Kruse, J. Wei: “Gravity wave drags in the atmosphere”; Ch 11 of: “Fast Physics in Large Scale Atmospheric Models: Parameterization, Evaluation, and Observations”, *Editors: Yangang Liu; Pavlos Kollias; Leo Donner (advisor), in revision*

7.3 Refereed Journal Articles

- [1] Alexander, M. J., **J. H. Beres** and L. Pfister, 2000: Tropical stratospheric gravity wave activity and relationship to clouds. *J. Geophys. Res.*, **105**, 22,299-22,309.
- [2]* Holton, J. R., **J. H. Beres**, and X. L. Zhou, 2002: On the vertical scale of gravity waves excited by localized thermal forcing. *J. Atmos. Sci.*, **59**, 2019–2023
- [3]* **Beres, J. H.**, M.J. Alexander, and J.R. Holton, 2002: Effects of tropospheric wind shear on the spectrum of convectively generated gravity waves. *J. Atmos. Sci.*, **59**, pp. 1805–1824
- [4]* **Beres, J. H.**, M.J. Alexander, and J.R. Holton, 2004a: A method of specifying the gravity wave spectrum above convection based on latent heating properties and background wind. *J. Atmos. Sci.*, **61**, 324– 337.
- [5]* **Beres, J. H.**, 2004: Gravity wave generation by a three-dimensional thermal forcing. *J. Atmos. Sci.*, **61**, 1805 – 1815.
- [6] Alexander, M. J., M. May and **J. H. Beres**, 2004: Gravity waves generated by convection in the Darwin area during DAWEX, *J. Geophys. Res.*, **109**, D20S04, 10.1029/2004JD004729
- [7] **Beres, J. H.**, R. R. Garcia, B. A. Boville and F. Sassi, 2005a: Implementation of a gravity wave source spectrum parameterization dependent on the properties of convection in the Whole Atmosphere Community Climate Model (WACCM), *J. Geophys. Res.*, **110**, D10108, doi:10.1029/2004JD005504
- [8] **Beres, J. H.**, 2005b: Estimates of mesospheric gravity wave activity over convection from a global model, *Adv. Space Res.*, **35**, 1933-1939
- [9] **Richter, J. H.** and R. R. Garcia 2005: On the forcing of the Mesospheric Semi-Annual Oscillation in the Whole Atmosphere Community Climate Model, *Geophys. Res. Lett.*, **33**, 10.1029/2005GL024378
- [10] Alexander, M. J., **J. H. Richter**, and B. R. Sutherland, 2006: Generation and Trapping of Gravity Waves from Convection with Comparison to Parameterization, *J. Atmos. Sci.*, **63**, 2963–297
- [11] Chang, L., S. Palo, M. Hagan, **J. H. Richter**, R. R. Garcia, D. Rigglin, and D. Fritts, 2008: Structure of the Migrating Diurnal Tide in the Whole Atmosphere Community Climate Model, *Adv. Space Res.*, **41**, 1398-1407
- [12] **J. H. Richter** and P. J. Rasch, 2008: Effects of convective momentum transport on the atmospheric circulation in the Community Atmosphere Model, version 3, *J. Climate*, **21**, 1487 - 1499
- [13] Neale, R. B., **J. H. Richter**, and M. Jochum, 2008: The Impact of Convection on ENSO: From a Delayed Oscillator to a Series of Events, *J. Climate*, **21**, 5904–5924

- [14] **J. H. Richter.**, F. Sassi, R. R. Garcia, K. Matthes, and C. A. Fischer, 2008: Dynamics of the middle atmosphere as simulated by the Whole Atmosphere Community Climate Model, version 3 (WACCM3), *J. Geophys. Res.*, **113**, doi:10.1029/2007JD009269
- [15] **J. H. Richter.**, F. Sassi, and R. R. Garcia, 2010: Toward a Physically Based Gravity Wave Source Parameterization in a General Circulation Model, *J. Atmos. Sci.*, **67**, 136 – 156
- [16] A. K. Smith, R. R. Garcia, D. R. Marsh, D.E. Kinnison, and **J. H. Richter**, 2010: Simulations of the response of mesospheric circulation and temperature to the Antarctic ozone hole. *Geophys. Res. Lett.*, **37**, doi: 10.1029/2010GL045255.
- [17] H.-L. Liu, B. T. Foster, M. E. Hagan, J. M. McInerney, A. Maute, L. Qian, A. D. Richmond, R. G. Roble, S. C. Solomon, R. R. Garcia, D. Kinnison, D. R. Marsh, A. K. Smith, **J. H. Richter**, F. Sassi, and J. Oberheide, 2010: Thermosphere Extension of the Whole Atmosphere Community Climate Model, *J. Geophys. Res.*, **115**, doi:10.1029/2010JA015586
- [18] V. Limapsuvan, M. J. Alexander, Y. J. Orsolini, D. L. Wu, **J. H. Richter** and C. Yamashita, 2011: Mesoscale simulations of gravity waves during the 2008–2009 major stratospheric sudden warming, *J. Geophys. Res.*, **116**, doi:10.1029/2010JD015190
- [19] **H. Richter.**, K. Matthes, N. Calvo and L. Gray, 2011: Influence of the quasi-biennial oscillation and El Niño–Southern Oscillation on the frequency of sudden stratospheric warmings, *J. Geophys. Res.*, **116**, doi: 10.1029/2011JD015757
- [20] K. Smith, R. R. Garcia, D. R. Marsh, and **J. H. Richter**, 2011: WACCM simulations of the mean circulation and trace species transport in the winter mesosphere, *J. Geophys. Res.*, **116**, doi:10.1029/2011JD016083
- [21] V. Limpasuvan, **J. H. Richter**, Y. J. Orsolini, F. Stordal, O. Kvissel, 2012: The roles of planetary and gravity waves during a major stratospheric sudden warming as characterized in WACCM, *J. Atmos. Sol.-Terr. Phys.*, **78-79**, 84-98
- [22] O. Kvissel, Y. Orsolini, F. Stordal, V. Limpasuvan, **J. H. Richter** and D. Marsh 2012: Mesospheric intrusion and anomalous chemistry during and after a major stratospheric sudden warming, *J. Atmos. Sol.-Terr. Phys.*, **78**, 116 - 124
- [23] Neale, R. B., **J. Richter**, S. Park, P. H. Lauritzen, S. J. Vavrus, P. J. Rasch, and M. Zhang, 2013: The mean climate of the Community Atmosphere Model (CAM4) in forced SST and fully coupled experiments. *J. Climate*, **26**, 5150-5168
- [24] **Richter, J. H.**, J. T. Bacmeister and A. Solomon, 2014: “On the simulation of the Quasi-Biennial Oscillation in the Community Atmosphere Model, version 5 (CAM5)”, *J. Geophys. Res.*, DOI: 10.1002/2013JD021122
- [25] **Richter, J. H.**, A. Solomon, and J. T. Bacmeister, 2014: “Effects of increased vertical resolution on the simulation of tropospheric and stratospheric climate”, *J. Adv. Mod. Earth Sys.*, DOI: 10.1002/2013MS000303
- [26] A. Solomon, **J. H. Richter**, and J. T. Bacmeister, 2014: “An Objective Analysis of the Extratropical QBO in ERA-Interim and the Community Atmosphere Model, Version 5”, *Geophys. Res. Lett.*, **41**, 10.1002/2014GL061801
- [27] **Richter, J. H.**, C. Deser, and L. Sun, 2015: “Effects of Stratospheric Variability on El Nino Teleconnections”, *Env. Res. Lett.*, **10**, doi:10.1088/1748-9326/10/12/124021
- [28] C. Stephan, M. J. Alexander, and **J. H. Richter**, 2016: “Characteristics of gravity waves from convection and implications for their parameterization in global circulation models”, *J. Geophys. Res.*, **73**, DOI: <http://dx.doi.org/10.1175/JAS-D-15-0303.1>
- [29] Wei J., F. Zhang, and **J. H. Richter**, 2016: “An Analysis of Gravity Wave Spectral Characteristics in Moist Baroclinic Jet-Front Systems”, *J. Atmos. Sci.*, **73**, DOI: <http://dx.doi.org/10.1175/JAS-D-15-0316.1>

- [30] Polvani, L. M., 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**, DOI: 10.1175/JCLI-D-16-0277.1
- [31] Mills, M., S. Tilmes, **J. H. Richter**, B. Kravitz, D. G. MacMartin, A. A. Glanville, J. J. Tribbia, J. F. Lamarque, F. Vitt, A. Schmidt, A. Gettelman, R. B. Neale, C. Hannay, J. T. Bacmeister, D. E. Kinnison: 2017: ‘CESM1(WACCM) at 1o: a new tool for chemistry-climate studies of interactive stratospheric aerosols’, *J. Geoph. Res.*, **122**, 13,061–13,078. <https://doi.org/10.1002/2017JD027006>
- [32] **Richter, J. H.**, S. Tilmes, M. Mills, J. Tribbia, B. Kravitz, D. MacMartin, F. Vitt, J. F. Lamarque, 2017: “Stratospheric dynamic response and ozone feedback in the presence of SO₂ injections”, *J. Geoph. Res.*, **122**, 12,557–12,573. <https://doi.org/10.1002/2017JD026912>
- [33] Tilmes, S., **J. H. Richter**, M. Mills, B. Kravitz, D. MacMartin, F. Vitt, J. Tribbia, J. F. Lamarque, 2017: “Sensitivity of stratospheric SO₂ injection locations on aerosol distribution and climate response”, *J. Geoph. Res.*, **122**, 12,591–12,615. <https://doi.org/10.1002/2017JD026888>
- [34] MacMartin D., B. Kravitz, S. Tilmes, **J. H. Richter**, M. Mills, J. Tribbia, J.F. Lamarque, 2017: The climate response to stratospheric aerosol geoengineering can be tailored using multiple injection locations”, *J. Geoph. Res.*, **122**, 12,574–12,590. <https://doi.org/10.1002/2017JD026868>
- [35] Kravitz B., D. MacMartin, M. Mills, **J. H. Richter**, S. Tilmes, J. F. Lamarque, J. Tribbia, and F. Vitt, 2017: First simulations of designing stratospheric sulfate aerosol geoengineering to meet multiple simultaneous climate objectives, *J. Geoph. Res.*, **122**, 12,616–12,634. <https://doi.org/10.1002/2017JD026874>
- [36] **Richter, J. H.**, B. Kravitz, D. MacMartin, S. Tilmes, M. Mills, J. Tribbia, F. Vitt, J. F. Lamarque, 2018: “Stratospheric response in the first geoengineering simulation meeting multiple surface climate objectives”, *J. Geoph. Res.*, **123**, 5762–5782, <https://doi.org/10.1029/2018JD028285>
- [37] Butchart, N., J. Anstey, K. Hamilton, S. Osprey, A. Bushell, Y. Kawatani, F. Lott, J. Scinocca, T. Stockdale, P. Braesicke, C. Cagnazzo, C. Chen, R. Garcia, J. Garia-Serrano, L. Gray, L. Holt, T. Kerzenmacher, Y-H Kim, P. Lin, J. McCormack, C. McLandress, H. Naoe, H. Pohlmann, **J. H. Richter**, A. Scaife, V. Schenzinger, F. Serva, S. Watanabe, K. Yoshida, S. Yukimoto 2018: Overview of experiment design and comparison of models participating in the SPARC Quasi-Biennial Oscillation initiative (QBOi), *Geophy. Mod. Dev.*, **11**, 1009-2032
- [38] Tilmes, S., **J. H. Richter**, M. Mills, B. Kravitz, D. MacMartin, F. Vitt, J. Tribbia, J. F. Lamarque, 2018: “Effects of Different Stratospheric SO₂ Injection Altitudes on Stratospheric Chemistry and Dynamics”, *J. Geoph. Res.*, **123**, 4654-4673
- [39] Wang, X, Y. Wu, W-W. Tung, **J. H. Richter**, S. Tilmes, C. Orbe, Y. Huang, Y. Via, D. E. Kinnison, 2018: “The simulation of stratospheric water vapor over the Asian summer monsoon region in WACCM models”, *JGR*, **123**, 20,1 1,377 - 11, 391, <https://doi.org/10.1029/2018JD028971>
- [40] Madronich, S., S. Tilmes, B. Kravitz, D. G. MacMartin, and **J. H. Richter**, 2018: “Response of Surface Ultraviolet and Visible Radiation to Stratospheric SO₂ Injections”, *Atmosphere*, **9**, 432, doi:10.3390/atmos9110432
- [41] Tilmes, S., **Richter J. H.**, B. Kravitz, D. MacMartin, M. Mills, I. Simpson, A. S. Glanville, J. T. Fasullo, A. S. Philips, J-F. Lamarque, J. Tribbia, J. Edwards, S. Mickelson, S. Gosh 2018: “CESM1(WACCM) Stratospheric Aerosol Geoengineering Large Ensemble (GLENS) Project”, *BAMS*, **99**, **11**, DOI:10.1175/BAMS-D-17-0267.1
- [42] Fasullo, J. T., Tilmes, S., **Richter J. H.**, B. Kravitz, D. MacMartin, M. Mills, I. R. and Simpson, 2018: “Persistent Polar Ocean Warming in a Strategically Geoengineered Climate”, *Nature Geo.*, **11**, 910-914

- [43] Garcia R. R. and **J. H. Richter**: The momentum budget of the quasi-biennial oscillation in the high vertical resolution CESM1(WACCM), 2018, *J. Atmos. Sci.*, 76, 69 - 87, <https://doi.org/10.1175/JAS-D-18-0088.1>
- [44] Kravitz B., D. MacMartin, S. Tilmes, **J. H. Richter**, M. J. Mills, J. F. Lamarque, J. Tribbia, and W. Large 2019: “Holistic Assessment of SO₂ Injections Using CESM1(WACCM): Introduction to the Special Issue”, *J. Geophys. Res. Atmos.*, 124, 444-450.
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- [71] L. Sun, J. Perlwitz, **J. H. Richter**, M. Hoerling, J. W. Hurrell (2020): Attribution of NAO predictive skill beyond two weeks in Boreal winter”, *GRL*, 47, e2020GL090451. <https://doi.org/10.1029/2020GL090451>
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- [75] Eastham, S., S. Doherty, D. Keith, **J. H. Richter**, and L. Xia (2021), Improving models for solar climate intervention research, *Eos*, 102, <https://doi.org/10.1029/2021EO156087>.

7.4 Journal Articles in Preparation or Submitted

- [76] Anstey, J. A. , I. R. Simpson, **J. H. Richter**, L. J. Gray, H. Naoe, M. Taguchi, P. Braesicke, A. Bushell, N. Butchart, C. Cagnazzo, C. -C. Chen, H. -Y. Chun, Y. Kawatani, T. Kerzenmacher, Y. -H. Kim, C. McLandress, H. Naoe, S. Osprey, J. H. Richter, A. Scaife, J. Scinocca, F. Serva, S. Versick, S. Watanabe, K. Yoshida, and S. Yukimoto (2021): QBO teleconnections in a multi-model ensemble of QBO-resolving models, *QJRMS*, *Accepted*
- [77] Chen C.-C., **J. H. Richter**, C. Liu, M. W. Moncrieff, Q. Tang, W. Lin, S. Xie and P. J. Rasch (2021): “Effects of organized mesoscale heating on the MJO and precipitation in E3SMv1”, *JAMES*, *Revised*
- [78] Pedatella, N. M., **J. H. Richter**, A. A. Glanville, and J. Edwards (2021): Predictability of the Mesosphere and Lower Thermosphere during Major Sudden Stratospheric Warmings”, *GRL*, *Submitted*
- [79] Tilmes, S., **J. H. Richter**, B. Kravitz, D.G. MacMartin, M. J. Mills, A. A. Glanville, D. Vioni, D. Kinnison, R. Mueller (2021): “Sensitivity of climate intervention stratosphere sulfur injections on stratospheric ozone”, *GRL*, *Submitted*
- [80] Osprey S. M., J. Alexander, J. Anstey, M. P. Baldwin, N. Butchart, L. Gray, Y. Kawatani, P. Newman, and **J. H. Richter** (2021): “The Quasi-biennial Oscillation: Processes, Predictability and Projections”, *Nature Reviews Earth and Environment*, *Submitted*
- [81] **J. H. Richter**, A. A. Glanville et al., (2021): “A subseasonal Earth system prediction framework with CESM2“, *JAMES*, *Submitted*
- [82] Davis, N. A., **Richter J. H.**, Glanville A. A., Edwards, J., LaJoie E. (2021): “Limited surface impacts of the January 2021 sudden stratospheric warming”, *Nature Communications*, *Submitted*

7.5 Internally Refereed Publications

- [1] Neale, R. B., **J. H. Richter**, A. J. Conley, S. Park, P. H. Lauritzen, A. Gettelman, D. L. Williamson, P. J. Rasch, S. J. Vavrus, M. A. Taylor, W. D. Collins, M. Zhang, S.-J. Lin, 2010: Description of the NCAR Community Atmosphere Model (CAM 4.0), *NCAR Tech. Note TN-485*.

7.6 Non-referred Written Publications

- [1] **Beres, J. H.** and Freeman, P. K.: Potential effects of climate change on the energy infrastructure in developing countries; case study: Honduras; Institute for Applied Systems Analysis (*IIASA*) *internal report*, 2000
- [2] M. A. Geller, H. Liu, **J. H. Richter**, D. Wu, and F. Zhang, 2006: Gravity Waves in Weather, Climate, and Atmospheric Chemistry: Issues and Challenges for the Community (White Paper)
- [3] **J. H. Richter**, M. A. Geller, R. R. Garcia, H. Liu, and F. Zhang, 2006: Report on the Gravity Wave Retreat, *SPARC Newsletter #28*, January 2007

7.7 Invited Presentations

- [1] **Beres, J. H.**, M. J. Alexander, and J. R. Holton: Gravity waves generated by tropical convection: Generation Mechanisms and Implications for General Circulation Models, Atmospheric Chemistry Division Seminar, NCAR, Boulder, CO Jul 2002
- [2] **Beres, J. H.**: Convectively Generated Gravity Waves: Generation Mechanisms and New Steps Towards Quantifying Their Role in The Atmosphere, Dept. of Physics, University of Toronto, Toronto, Canada Apr 2003
- [3] **Beres, J. H.**: Convectively Generated Gravity Waves: Generation Mechanisms and Implications for Their Role in The Middle Atmosphere, Meteorological Service of Canada (MSC), Toronto, Canada Oct 2003
- [4] **Beres, J. H.**: Gravity Wave Excitation by Convection and its Implication for Parameterizations in General Circulation Models, Chapman Conference on Gravity Waves Processes and Parameterization, HI Jan 2004
- [5] **Beres, J. H.**, R. Garcia, B. Boville, and F. Sassi: Linear theory estimates of global distribution of convectively generated gravity waves, CGU/AGU/ SEG/ EEGS Join Assembly, Montreal, Canada May 2004
- [6] **Beres, J. H.**, R. Garcia, B. Boville, and F. Sassi: Effects of a gravity wave spectrum linked to convection on the circulation of the upper atmosphere, 35th COSPAR Scientific Assembly, Paris, France Jul 2004
- [7] **Beres, J.H.**: Lower and Upper Atmospheric Coupling: Role of Gravity Waves, Dept. of Astronomy, Boston University, Boston, MA Feb 2005
- [8] Sassi, F., **J. H. Richter**, B. A. Boville, and R. R. Garcia: Experiments with WACCM: a sensitivity study, The Institute for Integrative and Multidisciplinary Earth Studies (TIIMES) Gravity Wave Retreat, Boulder, CO Jun 2006
- [9] **J. H. Richter**: Source spectrum parameterizations for convectively generated gravity waves, The Institute for Integrative and Multidisciplinary Earth Studies (TIIMES) Gravity Wave Retreat, Boulder, CO Jun 2006
- [10] **J. H. Richter**: Convective Momentum Transport in CAM3, The Institute for Integrative and Multidisciplinary Earth Studies (TIIMES) Gravity Wave Retreat, Boulder, CO Jul 2006
- [11] **J. H. Richter** and J. T. Bacmeister: "Sensitivity of the Quasi-Biennial Oscillation to top boundary condition and model grid", Community Earth System Model Annual Meeting, Breckenridge, CO 2014

- [12] **J. H. Richter**, J. T. Bacmeister, L. Sun and C. Deser: “Effects of the vertical grid on the QBO and tropospheric El Niño Response”, Pacific Northwest National Laboratory (PNNL) seminar, Pasco, WA Mar 2015
- [13] **J. H. Richter** and J. T. Bacmeister: “QBO in CAM and WACCM”, 1st SPARC QBO Intercomparison Workshop, Victoria, CA 2015
- [14] **J. H. Richter**: “Effects of the stratosphere on El Niño Impacts”, Association for Talented and Gifted, San Juan, Puerto Rico, Sep 2015
- [15] **J. H. Richter**: “Effects of the stratosphere on El Niño Impacts”, Universidad Metropolitana, San Juan, Puerto Rico, Sep 2015
- [16] **J. H. Richter**: “Pathways to Geosciences: Professional and Personal”, Promoting Geoscience Research, Education & Success Workshop, Estes Park, CO, Sep 2015
- [17] **J. H. Richter**, L. Sun, C. Deser and J. Bacmeister: “Impacts of a better-resolved stratosphere on El Niño teleconnections”, Colorado State University, Ft. Collins, CO, Oct 2015
- [18] **J. H. Richter**, L. Sun, C. Deser and J. Bacmeister: “Why do GCMs need a well-resolved stratosphere to get El Niño impacts right? ”, Geophysical Fluid Dynamics Laboratory (GFDL), Princeton, NJ, Nov 2015
- [19] **J. H. Richter** and S. Tilmes, “ Climate Intervention Research at NCAR”, State Department, Washington, DC Dec 2016
- [20] **J. H. Richter** and N. Butchart, Y. Kawatani, A. Bushell, J. Anstey: “The Quasi-biennial oscillation in a warming climate”, Max Planck Institute, Hamburg, Germany, June 2018
- [21] **J. H. Richter** and N. Butchart, Y. Kawatani, A. Bushell, J. Anstey: “The Quasi-biennial oscillation in a warming climate and the role of GW parameterizations”, Multiscale Dynamics of Gravity Waves (MS-GWaves) workshop, Kuhlungsborn, Germany, March 2019
- [22] **J. H. Richter** and N. Butchart, Y. Kawatani, A. Bushell, J. Anstey: “The Quasi-biennial oscillation in a warming climate”, NASA-GMAO, Greenbelt, MD, May 2019
- [23] **J. H. Richter** and C.-C. Chen: “QBO Changes in E3SM”, DOE E3SM All-hands Meeting, Sep 2019
- [24] **J. H. Richter**, C -C. Chen, M. Moncrieff, and C. Liu: “Impact of mesoscale convection parameterization and convective gravity wave drag in E3SMv1”, DOE PI Meeting, Washington DC, Nov 2019
- [25] **J. H. Richter**, “Overview of SPARC relevant research at NCAR”, SPARC SSG Meeting, Boulder, CO, Nov 2019
- [26] **J. H. Richter**, “Future projections of the QBO and QBO teleconnections in global models”, Colorado State University, Fort Collins, CO, February 2020
- [27] **J. H. Richter**, “Subseasonal to decadal prediction with CESM”, CESM Scientific Steering Committee (SSC) meeting, April 2020
- [28] **J. H. Richter**, “Subseasonal prediction with CESM”, CGD Advisory Panel, May 2020
- [29] **J. H. Richter**, Speaker and Panelist, Sunlight Reflection briefing organized by SilverLining NGO, May 2020
- [30] **J. H. Richter**, Class Invited Speaker, “Climate Disruption: Emerging Topics in Policy, Politics, and Technology of Climate Change”, Harvard University, Sep 2020
- [31] **J. H. Richter**, “S2S Prediction with CESM”, WMO Working Group on Numerical Experimentation (WGNE) meeting, Nov 2020
- [32] **J. H. Richter**, Panelist, Open Society Foundation, Discussion on Geoengineering and Climate Justice, Nov 2020

- [33] **J. H. Richter**, Panelist, NOAA/CPO/ESSM - DOE/ESSD Precipitation Processes and Predictability Workshop, Dec 2020
- [34] **J. H. Richter**, “SAI Simulations in support of the Safe Climate Research Initiative”, Geoengineering Modeling Research Consortium Lightning Talks, Jan 2021
- [35] **J. H. Richter**, “Subseasonal-to-seasonal (S2S) prediction with CESM1, CESM & CESM2(WACCM)”, Naval Research Laboratory, Jan 2021
- [36] **J. H. Richter**, “Subseasonal to decadal prediction with CESM”, UCAR Board of Trustees, Jan 2021

7.8 Contributed Presentations

- [1] **Beres, J. H.**, M.J. Alexander, and J.R. Holton: Forcing of the stratospheric circulation by convectively generated gravity waves: the role of tropospheric wind shear, Stratospheric Processes And their Role in Climate (SPARC) meeting, Mar del Plata, Argentina 2000
- [2] **Beres, J. H.**, M.J. Alexander, and J.R. Holton: Effects of varying tropospheric wind shear on the spectrum of gravity waves generated by tropical convection, American Meteorological Society Annual Meeting, Long Beach, CA 2000
- [3] **Beres, J. H.**, M.J. Alexander, and J.R. Holton: A representation of the full gravity wave spectrum generated by convection in realistic environmental wind conditions, American Meteorological Society 12th Conference on the Middle Atmosphere, San Antonio, TX 2004
- [4] Alexander M. J., P. May and **J. H. Beres**: Gravity Wave Generation by Small-Scale Transient Convection During the Darwin Area Wave Experiment (DAWEX), Chapman Conference on Gravity Waves Processes and Parameterization, HI 2004
- [5] Sassi, F., **Beres J. H.** , B. Boville and R. R. Garcia: Gravity waves from tropospheric sources: Application to WACCM; Atmosphere Model Working Group Annual Meeting, Boulder, CO 2005
- [6] **Richter, J. H.** and R. R. Garcia: On the forcing of the Mesospheric Semi-annual Oscillation in the Whole Atmosphere Community Climate Model, American Meteorological Society 13th Conference on the Middle Atmosphere, Cambridge, MA 2005
- [7] **Richter, J. H.** and R. R. Garcia: Interaction between gravity waves and the 2-day wave in the Whole Atmosphere Community Climate Model, American Meteorological Society 13th Conference on the Middle Atmosphere, Cambridge, MA 2005
- [8] Chang, L., S. Palo, M. Hagan, **J. H. Richter**, and R. R. Garcia: Mean Structure and Variability of the Diurnal Tide in the NCAR Whole Atmosphere Community Climate Model, Energetics and Dynamics of Atmospheric Regions (CEDAR) Annual Meeting, Santa Fe, NM 2005
- [9] **Richter, J. H.** and R. R. Garcia: On the forcing of the Mesospheric Semi-annual Oscillation in the Whole Atmosphere Community Climate Model, Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR) Annual Meeting, Santa Fe, NM 2005
- [10] **Richter, J. H.** , A. K. Smith, and F. Sassi: Effects of mesospheric dynamics on the CO₂ concentrations in the mesosphere and lower thermosphere, The International Association of Geomagnetism and Aeronomy (IAGA) Scientific Assembly, Toulouse, France 2005
- [11] Sassi, F., **J. H. Richter**, B. A. Boville, and R. R. Garcia: Model consistent generation of gravity waves and their effects on simulations of the middle atmosphere: A case study with the WACCM model, Atmosphere Model Working Group Annual Meeting, Boulder, CO 2006

- [12] Sassi, F., **J. H. Richter**, B. A. Boville, and R. R. Garcia: Model consistent generation of gravity waves and their effects on simulations of the middle atmosphere: A case study with the WACCM model, European Geophysical Union Meeting, Vienna, Austria 2006
- [13] **J. H. Richter** and P. J. Rasch: Convective momentum transport in the Community Atmosphere Model (CAM3), Community Climate Systems Model Workshop, Breckenridge, CO 2006
- [14] Sassi, F et al.: WACCM simulations in 2006-2007, Community Climate Systems Model Workshop, Breckenridge, CO 2006
- [15] Kristen L. Corbosiero, V. Cheruvu, **J. H. Richter**, C. Johnson, and T. Eastburn: Climate and weather, the two go together: Girl Scouts at the National Center for Atmospheric Research program, Seventh International Conference on School and Popular Meteorological and Oceanographic Education, Boulder, CO 2006
- [16] Chang, L., S. Palo, M. Hagan, **J. H. Richter**, R. R. Garcia, D. Riggan, and D. Fritts: Structure of the Migrating Diurnal Tide in the Whole Atmosphere Community Climate Model, Energetics and Dynamics of Atmospheric Regions (CEDAR) Annual Meeting, Santa Fe, NM 2006
- [17] Hassiotis, A. D., **J. H. Richter**, and T. J. Kane: A numerical study of convectively generated gravity waves over the maritime continent region using the weather research and forecasting (WRF) model, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA 2006
- [18] **J. H. Richter**, and R. Neale: Impact of modifications of convection schemes on CAM3 and CCSM3 simulations, Atmosphere Model Working Group Annual Meeting, Boulder, CO 2007
- [19] Jochum, M., R. Neale and **J. H. Richter**: ENSO mechanisms in the new CCSM, 16th Conference on Atmospheric and Oceanic Fluid Dynamics, Santa Fe, NM 2007
- [20] Chang, L., S. Palo, **J. H. Richter**, and R. R. Garcia: Planetary wave induced migrating diurnal tidal variability in WACCM3, Energetics and Dynamics of Atmospheric Regions (CEDAR) Annual Meeting, Santa Fe, NM 2007
- [21] Sassi, F., **J. H. Richter**, and R. R. Garcia: A sensitivity study of the middle atmosphere to changes in the parameterized momentum drag of gravity waves, International Union of Geodesy and Geophysics (IUGG) Meeting, Perugia, Italy 2007
- [22] Sassi, F., **J. H. Richter**, and R. R. Garcia: A sensitivity study of the middle atmosphere to changes in the parameterized momentum drag of gravity waves, 14th Conference on the Middle Atmosphere, Portland, OR 2007
- [23] **J. H. Richter**, F. Sassi and R. R. Garcia: Effects of Changes in Gravity Wave Parameterization on the Troposphere and Lower Stratosphere, Atmosphere Model Working Group Annual Meeting, Boulder, CO 2008
- [24] **J. H. Richter**, F. Sassi, and R. R. Garcia: Towards a non-arbitrary gravity wave source parameterization in a general circulation model, European Geophysical Union (EGU), Vienna, Austria 2008
- [25] **J. H. Richter**, F. Sassi and R. R. Garcia: Source oriented GW parameterization in WACCM3, Community Climate Systems Model Workshop, Breckenridge, CO 2008
- [26] **J. H. Richter**, F. Sassi, C. A. Fischer and R. R. Garcia: Gravity Waves in CAM3.5, Community Climate Systems Model Workshop, Breckenridge, CO 2008
- [27] **J. H. Richter**, R. R. Garcia, A. Gettleman, D. Kinnison, D. Marsh, and A. K. Smith, Climatology of WACCM3.5, WACCM Working Group Meeting, Boulder, CO 2009
- [28] C. Chen, **J. H. Richter**, R. R. Garcia, J. Bacmeister, and A. K. Smith: A momentum and energy conserving gravity wave drag parameterization in a General Circulation Model, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA 2009

- [29] C. Chen, **J. H. Richter**, R. R. Garcia, J. Bacmeister, and A. K. Smith: Effects of momentum and energy conservation in a high-lid general circulation model, WACCM Working Group Meeting, Boulder, CO 2010
- [30] C. Chen, **J. H. Richter**, R. R. Garcia, J. Bacmeister, and A. K. Smith: A momentum and energy conserving gravity wave drag parameterization in a General Circulation Model, European Geophysical Union (EGU), Vienna, Austria 2010
- [31] **J. H. Richter**, Chih-Chieh Chen, Rolando R. Garcia, Anne K. Smith, and Julio T. Bacmeister: Effects of gravity wave parameterization changes on the middle and upper atmosphere in the Whole Atmosphere Community Climate Model, European Geophysical Union (EGU), Vienna, Austria 2010
- [32] A. Solomon, **J. H. Richter**, and J. Bacmeister: Polar Atmospheric Variability in CAM5 with Enhanced Vertical Resolution, Community Earth System Model Workshop, Breckenridge, CO 2013
- [33] **J. H. Richter**, J. Bacmeister, and A. Solomon: Higher Vertical Resolution in CAM - do we need it?, Community Earth System Model Workshop, Breckenridge, CO 2013
- [34] **J. H. Richter**, J. Bacmeister, and A. Solomon: "Effects of increased vertical resolution on the simulation of mean climate and the Quasi-Biennial Oscillation", Community Earth System Model Atmosphere Working Group Meeting, Boulder, CO, 2014
- [35] **J. H. Richter**, J. Bacmeister, and A. Solomon: "Effects of vertical resolution, dynamical core, and top boundary condition on the simulation of the Quasi-Biennial Oscillation in the Community Atmosphere Model, Version 5", European Geophysical Union Annual Meeting, Vienna, Austria 2014
- [36] **J. H. Richter** and J. T. Bacmeister: "Effects of a higher model lid on the simulation of climate in CAM5", Community Earth System Model Annual Meeting, Breckenridge, CO 2014
- [37] **J. H. Richter**, J. T. Bacmeister, and L. Sun: "Influence of the model lid on the simulated tropospheric climate", American Meteorological Society Annual Meeting, Phoenix, AZ, 2015
- [38] **J. H. Richter**, J. T. Bacmeister, L. Sun, and C. Deser: "Effects of the QBO on ENSO teleconnections", Climate Variability Working Group Meeting, Boulder, CO 2015
- [39] **J. H. Richter**, J. T. Bacmeister, L. Sun, and C. Deser: "Effects of various vertical grids in CAM/WACCM", Atmosphere Model Working Group Meeting, Boulder, CO 2015
- [40] **J. H. Richter**, J. T. Bacmeister, R. R. Garcia, and A. Gettleman: "On the simulation of the QBO in WACCM", Community Earth System Model Annual Meeting, Breckenridge, CO 2015
- [41] L. Sun, J. Richter and C. Deser: "How much can raising model lid improve the stratospheric and tropospheric simulation?", SPARC Regional Workshop, Boulder, CO 2015
- [42] **J. H. Richter**, L. Sun and C. Deser: "Effects of the stratosphere on El Niño teleconnections", SPARC Regional Workshop, Boulder, CO 2015
- [43] Hernandez-Espiet A., **J. H. Richter** and C. C. Chen: "Analysis of a better-resolved stratosphere on seasonal forecasts of the Northern Hemisphere Winter", American Meteorological Society Annual Meeting, New Orleans, LA, 2016
- [44] **J. H. Richter**, C. Deser and L. Sun: "Effects of Sudden Stratospheric Warmings and Quasi-biennial Oscillation on El Nino Teleconnections", American Meteorological Society Annual Meeting, New Orleans, LA, January 2016
- [45] **J. H. Richter**, L. Sun, C. Deser and J. Bacmeister: "The QBO and Stratospheric-tropospheric coupling", American Meteorological Society Annual Meeting, New Orleans, LA, 2016
- [46] A. K. Smith, **J. H. Richter**, R. R. Garcia: "Using gravity waves parameterizations to address WACCM discrepancies", SPARC Gravity Wave Symposium, State College, PA 2016

- [47] Ma, P., P. Rasch, S. Xie, H. Wang, B. Singh, W. Lin, K. Zhang, H. Wan, Y. Qian, C. Golaz, J. Bacmeister, R. Easter, S. Ghan, R. Neale, C. Hannay, J. Richter, S. Burrows, P. Cameron-Smith, P. Bogenschutz, V. Larson, P. Caldwell: "Tuning the NE30_L72 ACME V1 Atmosphere Model", ACME hands-on meeting, June 2016
- [48] **J. H. Richter**, R. G. Garcia, A. Smith: "Simulations with high vertical resolution WACCM for QBOi". CESM Annual Meeting, Breckenridge, CO June 2016
- [49] **J. H. Richter**, S. Tilmes, M. Mills, B. Kravitz, and Doug MacMartin: "A Holistic Assessment of SO₂ Injection into the Stratosphere", Defense Advance Research Projects Agency (DARPA), Washington, DC August 2016
- [50] **J. H. Richter**, L. Sun, R. G. Garcia, and C. Chen: "On the relationship between the QBO and the polar vortex in the NCAR models", SPARC Quasi-biennial Oscillation Workshop, Oxford, UK, September 2016
- [51] **J. H. Richter**, R. G. Garcia, and C. Chen: "The QBO simulated with the 110-level WACCM", SPARC Quasi-biennial Oscillation Workshop, Oxford, UK, September 2016
- [52] C. Chen, **J. H. Richter** and J. Bacmeister: "Sensitivity of the QBO to ozone and CO₂ in CAM5", QBOi Jack SPARC Quasi-biennial Oscillation Workshop, Oxford, UK, September 2016
- [53] **J. H. Richter**, S. Tilmes, M. Mills, B. Kravitz, and D. MacMartin: "Changes to the quasi-biennial oscillation due to SO₂ injections", AGU Annual Meeting, San Francisco, CA, December 2016
- [54] L. Sun, **J. H. Richter**, J. Perlwitz: "Role of stratospheric processes on ENSO-NAO connections on Seasonal-to-Subseasonal timescale", AGU Annual Meeting, San Francisco, CA, December 2016
- [55] **J. H. Richter**: "The quasi-biennial oscillation (QBO): Past, present, and the future", CGD/NCAR Seminar, February 2017
- [57] **J. H. Richter** and R. G. Garcia, "Interactive QBO simulations in a warming climate", CESM working group meetings, Boulder, CO February 2017
- [58] **J. H. Richter**, S. Tilmes, M. Mills, B. Kravitz, D. MacMartin, J. Tribbia, S. Glanville: "Geoengineering Research at NCAR", CESM Annual Meeting, Boulder, CO, June 2017
- [59] **J. H. Richter**, S. Tilmes, M. Mills, B. Kravitz, D. MacMartin, J. Tribbia, S. Glanville: "Stratospheric dynamical response and ozone feedbacks in the presence of SO₂ injections", CESM Annual Meeting, Boulder, CO, June 2017
- [60] **J. H. Richter**, J. Perlwitz, L. Sun, J. Bacmeister, and J. Tribbia: "Role of stratospheric processes in predicting the ENSO-NAO connections on subseasonal time scale", CESM Annual Meeting, Boulder, CO, June 2017
- [61] **J. H. Richter**, J. Anstey, N. Butchart, S. Osprey, K. Hamilton: "The Quasi-Biennial Oscillation Initiative (QBOi)", AMS Middle Atmosphere Meeting, Portland, OR, June 2017
- [62] **J. H. Richter**, S. Tilmes, M. Mills, A. Glanville, B. Kravitz, D. MacMartin: "Does the QBO have to disappear with geoengineering using sulfate aerosols?" Gordon Conference on Geoengineering, Sunday River, ME, July 2017
- [63] **J. H. Richter** and others: "Response of the QBO in 2x and 4x CO₂ worlds in QBOi models", QBOi Meeting, Kyoto, Japan, October 2017
- [64] Garcia R. G. and **J. H. Richter**: "An interrupted QBO event simulated with the Whole Atmosphere Community Climate Model", QBOi Meeting, Kyoto, Japan, October 2017
- [65] C. Chen and **J. H. Richter**: "Sensitivity of the QBO to ozone and CO₂ in CAM5"
- [66] A. Robock, L. Xia, S. Tilmes, M. Mills, **J. H. Richter**, B. Kravitz, and D. MacMartin: "Impacts of stratospheric sulfate geo engineering on PM_{2.5}", AGU Annual Meeting, Dec 2017
- [67] **J. H. Richter**, S. Tilmes, B. Kravitz, D. MacMartin, I. Simpson, M. Mills: "Building Confidence and Reducing Risks with Strategic Geoengineering", AMS Annual Meeting, Jan 2018

- [68] **J. H. Richter**: “Vertical resolution in the next generation CAM & WACCM”, AMWG working group meeting, Boulder, CO Feb 2018
- [69] **J. H. Richter**, L. Sun, and J. Perlwitz: “S2S simulations with 30-level an 46-level CESM1”, NOAA MAPP S2S Taskforce, Feb 2018
- [70] **J. H. Richter**, U. Niemeier, S. Tilmes, & M. Mills: “Comparing changes in the Quasi-biennial Oscillation in the presence of SO₂ injections in GCMs”, GeoMiP, Zurich, Switzerland
- [71] **J. H. Richter**: “Vertical resolution in the next generation CAM & WACCM”, CESM Annual Meeting, Boulder, CO Jun 2018
- [72] **J. H. Richter** and others: “Quasi-biennial oscillation in a warming climate. Part I: Overview and Metrics”, Kyoto, Japan Sep 2018
- [73] L. Xia, A. Robock, S. Tilmes, D. Lombardozzi, M. Mills, **J. H. Richter**, B. Kravitz, and D. MacMartin: “Impacts on Agriculture from Surface Ozone and Ultraviolet Radiation Changes Due to Stratospheric Sulfate Injection”, AGU Annual Meeting, Washington DC, Dec 2018
- [74] D. MacMartin, B. Kravitz, S. Tilmes, **J. H. Richter**, and M. J. Mills: “Climate Engineering: Design and Feedback”, AGU Annual Meeting, Washington DC, Dec 2018
- [75] J. Fasullo, S. Tilmes, **J. H. Richter**, B. Kravitz, D. MacMartin, and M. J. Mills: “Persistent Polar Ocean Warming in a Strategically Geoengineered Climate”, AGU Annual Meeting, Washington DC, Dec 2018
- [76] J. H. Richter, N. Butchart, Y. Kawatani, A. Bushell, J. Anstey (2019): “The Quasi-biennial Oscillation in a Warming Climate”, AMS Conference on the Middle Atmosphere, Phoenix, AZ, Jan 2019
- [77] L. Sun, J. Perlwitz, J. H. Richter, M. Hoerling (2019): “Attribution of NAO predictability beyond two weeks”, AMS Conference on the Middle Atmosphere, Phoenix, AZ, Jan 2019
- [78] **J. H. Richter**: Uncertainties in stratospheric dynamics and role of parameterized GWs GMRC Workshop, Boulder, CO May 2019
- [79] **J. H. Richter** and A. Glanville: S2S Prediction with CESM2 & CESM2(WACCM), CESM Annual Workshop, Boulder, CO June 2019
- [80] **J. H. Richter**: “Advances in modeling of stratospheric aerosol geoengineering: recent progress and future directions”, Geoengineering Modeling Research Consortium Workshop, Harvard University, Boston, MA, September 2019
- [81] **J. H. Richter** and others: “Whole Earth System Subseasonal Prediction Research Framework”, AGU Annual Meeting, San Francisco, CA, Dec 2019
- [82] **J. H. Richter** and others: “Subseasonal to Decadal Prediction Research Framework with CESM1 and CESM2”, AMS Annual Meeting, Boston, MA, Jan 2020
- [83] H. Kim, **J. H. Richter** and Z. Martin: “Insignificant QBO-MJO skill relationship in S2S and SubX reforecasts”, AMS Annual Meeting, Boston, MA, Jan 2020
- [84] **J. H. Richter** and others: “QBO-MJO teleconnections in S2S reforecasts and CMIP6 models”, NCAR-PCMDI telecon, March 2020
- [85] **J. H. Richter** and others: “Progress in simulating the QBO and QBO-MJO teleconnections in CMIP6 models“, CVCWG Meeting, Boulder, CO March 2020
- [86] **J. H. Richter**, Invited Speaker for “Emerging Topics in Policy, Politics, and Technology of Climate Change”, Harvard University, Boston, MA, September 2020
- [87] **J. H. Richter** and others : “Response of the QBO to a warming climate in global climate models”, EGU, May 2020

[88] **J. H. Richter** and others “S2S Prediction with CESM”, ESPWG/CESM annual meeting, June 2020