Curriculum Vitae

Jadwiga (Yaga) H. Richter

(previously 'Jadwiga H. Beres')

Climate and Global Dynamics Laboratory (CGD)
National Center for Atmospheric Research (NCAR)
1850 Table Mesa Dr, Boulder, CO 80305

jrichter@ucar.edu
Tel: 303-497-2613

1. Education:

Graduate Certificate in Instructional Design, University of Wisconsin, Menomonie, WI 2015

Ph.D. Atmospheric Sciences, University of Washington, Seattle, WA 2002

- 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

- 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

- Researched climate change and hurricane activity for policy makers

Research Assistant, University of Washington, Seattle, WA 1997 - 2002

- Modeled convection and gravity waves using a mesoscale model

Research Assistant, State University of New York, Purchase, NY 1997

- Analyzed turbulence data from British Airways flights

3. Scientific Accomplishments:

3.1 Contributions to Community Models:

[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^{o} to the 0.9x1.25^{o} 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] Leading Subseasonal to Seasonal (S2S) prediction efforts with various versions of CESM1, including a version with WACCM as the atmospheric component	2016 - present
[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

[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

Lead organizer, NCAR Explorer Series 2015 - 2017

- 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

- 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

- 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

- 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:

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:

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

[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-ERL), Co-I's: J. Bacmeister (NCAR) and L. Sun (NOAA-ERL), $508,505 2016 - 2018

[3] **DARPA**, Pi: A Holistic Assessment of Injection of SO2 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 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. Riggin, 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 SO_2 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.*, 12,616–12,634. https://doi.org/10.1002/2017JD026874

[36] 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

[37] Tilmes, S., **J. H. Richter**, M. Mills, B. Kravitz, D. MacMartin, F. Vitt, J. Tribbia, J. F. Lamarque, 2018: "Contrasting differences of stratospheric SO2 injections with altitudes outside the Equator", *J. Geoph. Res.*, *Accepted*

[38] **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, Accepted*

[39] 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, Accepted*

7.3 Journal Articles in Preparation or Submitted

[40] Sun L. , **J. H. Richter**, J. Perlwitz, 2017: How Strong Is the Relationship between the Quasi-biennial Oscillation and the Northern Hemisphere Extratropical Circulation? *Geoph. Res. Letts, submitted*

[41] 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, Submitted*

[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.*, *Submitted*

[43] D. G. MacMartin, W. Wang, B. Kravitz, S. Times, **J. H. Richter**, M. J. Mills 2018: "Timescale for detecting the climate response to stratospheric aerosol geoengineering", JGR-Atmospheres, *submitted*

[44] 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, *submitted*

7.4 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.

7.5 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

7.6 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 Nino 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

7.7 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. Riggin, 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 SO_2 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 SO_2 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 CO_2 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 PM2.5”, 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