Dr. ANDREW GETTELMAN
andrew.gettelman@pnnl.gov

EDUCATION:

University of Washington, Seattle, WA, Ph.D. Atmospheric Sciences, June 1999

Thesis: "Stratosphere-Troposphere Exchange & the Impact of commercial Aviation on the Atmosphere", James R. Holton Advisor

Certificate in Environmental Management, University of Washington Graduate School of Business, 1998

Princeton University, Princeton, NJ, BSE Civil Engineering, Certificate in Architecture 1992

PROFESSIONAL EXPERIENCE

Fellow of the American Geophysical Union, 2022
U.S. Government Security Clearance, 2015-present
Senior Scientist, Pacific Northwest National Laboratory, WA, Nov 2022-Present
Visiting Scientist, European Centre for Medium Range Weather Forecasts, UK, Aug 2019-Jul 2020
Visiting Professor, Atmospheric & Oceanic Physics, Oxford University, UK, Aug 2019-Jul 2020
Scientist IV (Senior Scientist), NCAR, Boulder, CO, May 2017-Nov 2022 (on leave)
Erskine Fellow, University of Canterbury, Christchurch, New Zealand, June-August 2016
Visiting Scientist, Max Planck Institute for Meteorology, Hamburg, June-August 2014
Visiting Professor, ETH Zürich, Switzerland, August 2011-July 2012
Scientist III, NCAR, Boulder, CO, July 2010-May 2017
NCAR Leadership Academy September 2005- June 2006
Scientist II, NCAR, Boulder CO, July 2006-July 2010
Scientist I, NCAR, Boulder CO, July 2003-July 2006
Project Scientist, NCAR, Boulder CO, October 2001-July 2003
Postdoctoral Fellow, Advanced Study Program, NCAR, Boulder, CO, 1999-October 2001

EDUCATIONAL ACTIVITIES

Donora Lecturer, Carnegie Mellon University, 2023
Lecturer, Oxford School of Climate Change, Oxford University, UK, 2020
Erskine Fellow & Lecturer, Department of Physics, University of Canterbury, New Zealand 2016
Visiting Professor/Lecturer, Institute for Atmosphere & Climate Science, ETH Zürich, 2011-2012
Steering committee, CESM Modeling Tutorial, August 2011
Lecturer, WAVACS, Winter School, Venice, Italy, February 2011
Coordinator and Lecturer, CCSM Modeling Tutorial, July 2010
Coordinator and Lecturer, CAM Modeling Tutorial, July 2009
Post-Doctoral Research Mentor, NCAR ASP Program, 2006-present
SOARS (research or writing) Mentor, Summer 2003, 2005, 2006
Coordinator and Lecturer, Program in Atmos & Ocean Sci, Univ Colorado, Boulder, 2001
Scientific instructor for elementary teachers, University of Washington, 1998
Governing Board Member, Program on the Environment, Univ of Washington, 1998-1999
Teaching Assistant, Atmospheric Sciences, U.W., Seattle, WA, 1995-1996
Coordinator, Latona Elementary School Outreach Project, University of Washington, 1997

PROFESSIONAL ACTIVITIES

Editor, Reviews of Geophysics, 2022-present
Co-Chair, WCRP Digital Earth Lighthouse Activity, 2022-present
Chair, NCAR Appointments Review Group (ARG), 2021-2022
Vice Chair, NCAR Appointments Review Group (ARG), 2020-2021
WCRP Digital Earth Lighthouse Activity Science Planning Team 2020-2022
ARM Science Board, 2020-2021
Coordinator, Aerosols, Clouds Precipitation and Climate (ACPC) Shallow Clouds Working Group under WCRP & IGBP (2019-present)
NASA Aerosol, Clouds, Convection and Precipitation (ACCP) Study, Science Coordinating Committee Member 2017-2021
NCAR Wyoming Supercomputer Center, Scientific Requirements Advisory Panel (2018-9)
Developmental Testbed Center, External Advisory Panel (2018-2021)
NCAR Earth Observing Laboratory External Advisory Panel (2017-present)
UCAR Information Technology Council (ITC) Science Representative (2016-2019)
Member, National Academy of Sciences Panel, Opportunities to Improve the Representation of Clouds and Aerosols in Climate Models with Classified Observing Systems, 2015-2016
DOE Atmospheric System Research, User Executive Committee Member (2015-2019)
Co-chair, NCAR Scientist's Assembly (NSA) Executive Committee (EC), 2014-2019
Steering Committee, SPARC-IGAC Chemistry Climate Model Initiative, 2012-2019
COMET Advisory Board, 2011-2017
Associate Editor, Reviews of Geophysics, 2010-2022
Lead Author for SPARC Chemistry Climate Model Assessment UT/LS Chapter, 2010
Associate Editor, JGR Atmospheres special issue on the Tropopause, 2007-2008
Steering Committee, SPARC-IGAC Atmospheric Chemistry and Climate Initiative, 2007-2012
Chair, NCAR Early Career Scientists Assembly (ECSA), 2007-2010
Lead, SPARC Tropopause Initiative, 2006-2010
Co-Coordinator, SPARC Chemistry-Climate Model Validation Project, 2005-2012
Contributing Author, Chapter 6, World Meteorological Organization Ozone Assessment 2006
American Meteorological Society Middle Atmosphere Committee, 2004-2007
AGU Atmospheric Sciences Section, Communications Secretary 2003-2006
Lead Author for Stratospheric Processes and their Role in Climate (SPARC), Assessment of water vapour in the lower stratosphere and upper troposphere, 1999-2000

AWARDS

Highly cited paper award, J. Advances in Modeling Earth Systems 2022
NCAR Director's Special Recognition Award: Development and Leadership of the System for Integrated Modeling of the Atmosphere, 2022
GRL Top Cited Article 2019-2020
NASA Group Achievement Award for ATTREX project, 2016
American Geophysical Union Atmospheric Sciences Ascent Award, 2015
Thompson Reuters Highly Cited Researcher, 2014-2022
Journal of the Atmospheric Sciences Editor's award, 2004

REVIEWS/CONFERENCE ORGANIZATION

Reviews of outside proposals/papers: 2003:13, 2004:26, 2005:19, 2006:26, 2007:27, 2008:18, 2009:17, 2010:16, 2011:12, 2012:16, 2013:19, 2014: 25, 2015: 27, 2016: 25, 2017: 23, 2018: 22 2019: 25, 2020: 40, 2021: 30, 2022: 25
Co-Chair, Aerosol, Clouds, Precipitation and Climate Shallow Cloud Sessions, May 2023
Local Organizer: WCRP Storm resolving modeling workshop, October 2022
Host, Aerosol, Clouds, Precipitation and Climate Annual Meeting, May 2022

Local Organizer: Data Assimilation Needs for Climate Prediction Workshop, May 2022
Chair, Review Committee, Research Center for Environmental Changes, Academia Sinica, Taipei, Taiwan, July 2021
Co-Chair, Aerosol, Clouds, Precipitation and Climate Shallow Cloud Sessions, May 2021
Chair, NASA Aerosol Clouds Convection and Precipitation Study Modeling Meeting, Nov 2020
Local Organizer/Host, Cloud Feedback Model Intercomparison Project, Annual Meeting, Sep 2020
Steering Committee, Workshop on System For Integrated Modeling of the Atmosphere, June 2020
Co-Chair, Aerosol, Clouds, Precipitation and Climate Shallow Cloud Sessions, April 2020
Organizer, Tutorial & Workshop on Future Physics for Global Atmospheric Models, July 2019
Chair, Gordon Research Conference on Climate and Radiation, July 2019
Local Organizer/Host, Cloud Feedback Model Intercomparison Project, Annual Meeting, Oct 2018
Local Organizer/Host, International Radiation Sensor Science Team Meeting, September 2018
Organizer, Modeling Aerosol Cloud Interactions, 8th Conference on Aerosol-Cloud Interactions, New Orleans, LA, January 2016
Program Committee, Chemistry-Climate Model Initiative Meeting, Rome, October 2015
Local Organizer, 2013 CCMI Workshop, Boulder, CO, May 2013
Organizer, Joint U.S.-Japan workshop on Observations of the Tropical Tropopause Layer, Honolulu, HI, October 2012
Local Organizing Committee, 2012 CCMVal Workshop, Davos, Switzerland, May 2012
Organizing committee, WAVACS, Workshop on Water Vapor, Paris, September 2011
Organizing committee and Lecturer, WAVACS, Winter School, Venice, Italy, February 2011
Steering Committee, Emerging Paradigms in the UTLS Workshop, October, 2009
Program Committee, Chemistry-Climate Model Validation Meeting, Toronto, June 2009
Session co-convenor, EGU Session on the Tropopause, April 2008
Convener, Microphysics Panel, Aviation-Climate Change Research Initiative Meeting, February 2008
Co-Chair, 14th AMS Middle Atmosphere Meeting, Portland, OR, August 2007
Program Committee, Chemistry-Climate Model Validation Meeting, Leeds, UK, June 2007
Program Committee, IGAC Atmospheric Chemistry at the Interfaces Meeting, Capetown, Sept 2006
Organizer, Workshop on Advancing Microphysics in Global Models, Boulder, CO, Nov 2005
Chair, Local Organizing Committee, Chemistry-Climate Model Validation Meeting, Boulder, 2005
Program Committee, 13th AMS middle atmosphere meeting, 2005
Co-Organizer of Workshop on Isotopes in the Earth System, Boulder, CO, Jan 2004
Organizer of 2 workshops on Summer Monsoon water vapor, Boulder, CO Oct 2001 & Sep 2002

FUNDING AWARDED

NASA Research Grant (PI), High Resolution Model Simulations in Support of the NASA Atmospheric Observing System (AOS) Mission, 2023-2025
NASA Research Grant (PI), Quantifying Uncertainty and Constraining Parameterizations of Clouds in Earth System Models using NASA observations**,** 2021-2025
NSF Cyberinfrastructure Research Grant (NCAR PI), Community-Base Weather and Climate Simulation with a Global Storm-Resolving Model, 2020-2025
DOE ASR Research Grant, Freezing Processes in Southern Ocean Mixed Phased Clouds, 2019-2022
NOAA Research Grant (NCAR PI), An Open Framework for Process-Oriented Diagnostics of Global Models, 2018-2021
NSF Polar Programs Grant (NCAR PI), Collaborative Research: Ice Supersaturation over the Southern Ocean and Antarctica, and its role in Climate, 2019-2021
NSF Grant (NCAR PI): Collaborative Research: Southern Ocean Clouds, Radiation, Aerosol Transport Experimental Study (SOCRATES), 2017-2020
NASA Research Grant, Advancing Cloud Microphysics for Seamless Prediction of Weather and Climate, 2017-2021
NOAA Research Grant, Tropical Intraseasonal Variability in Models and Observations, 2015-2018
NASA Research Grant, Advancing Cloud Microphysics in Global Models: Processes and the Challenge of High Resolution, 2014-2015

FAA Research Grant, Future Aviation Climate Impacts, 2013-2014
DOE Research Grant: Atmospheric System Research, Advancing Models and Evaluation of Cumulus, Climate and Aerosol Interactions, 2011-2014
NASA Research Grant, Utilizing NASA A-Train Datasets for IPCC Climate Projection Assessment 2011-2013
NSF Research Grant, Simulations of Anthropogenic Climate Change Using a Multi-Scale Modeling Framework, 2010-2015
NSF Research Grant, Collaborative Research: Cloud Macrophysical Parameterization and its Application to Aerosol Indirect Effects, 2010-2013
NASA Research Grant, Airborne Tropical Tropopause Experiment, 2010-2015
NSF/DOE Research Grant, Community Climate System Model Tutorial, 2010
NASA Research Grant, Observing and Modeling Cloud Influence on Recent and Projected Arctic Sea Ice Loss, 2010-2013
FAA Research Grant, Aviation Climate Impacts, 2010-2013
NSF SGER Grant, Community Atmosphere Model Tutorial, 2009
NASA Research Grant, Advanced Bin Microphysics in a Global Model (co-I), 2009-2013
NASA Research Grant, Advancing Cold Cloud Physics in Global Models, PI, 2009-2013
NSF SGER Grant, (ANT) Humidity and Ice Supersaturation Observations at South Pole Station 2008
NASA Research Grant, Confronting Chemistry Climate Models with Data, PI, 2008-2011
NASA Research Grant, Polar Mesospheric Clouds, Co-I, 2006-2009
NSF SGER Grant Advancing Cloud Microphysics in the Community Climate System Model, PI 2005
NASA Research Grant: Observations & Modeling of the Tropical Radiation Balance, Co-I 2004-7
NCAR Strategic Initiative: Integrative Science in the UT/LS, Co-I 2004-7
NASA Research Grant: Integrated Investigations of Water, Clouds & Temperatures, Co-I 2004-7
NSF SGER Grant for Workshop on Isotopes in the Earth System, PI 2003
NASA Research Grant: Stratosphere Troposphere Exchange of Water Vapor, Co-I 2001-2004
NCAR Advanced Study Program Postdoctoral Fellowship, 1999-2001

Graduate and Postdoctoral Advising:

Thesis committees: Ray Nassar (U Waterloo Canada, Peter Bernath Advisor, 2008), Qiong Yang (U. Washington Seattle, Qiang Fu advisor, 2010), Lin Su (University of Colorado, O. B. Toon advisor, 2012), Nathalie Schaller (ETH-Zurich, Reto Knutti Advisor, 2012), Anna Cristan (ETH-Zurich, Thomas Peter Advisor, 2012), Miriam Kuebbler (ETH-Zurich, Ulrike Lohmann Advisor, 2012), Sambingo Cardoso (Univ. Lisbon, Pedro Miranda advisor, 2013), Pengfei Yu (Univ. Colorado, Brain Toon advisor, 2015), Lei Lin (Lanzhou Univ, Q. Fu advisor, 2016), Vineel Kumar (CU, J. Kay advisor, 2018), A. Morrison (CU, J. Kay advisor, 2019), B. Berry (U. Utah, J. Mace advisor, 2019), Kanishk Gohil (Univ. Maryland, Akua Asa-Awuku advisor, 2022)

Postdocs: Hugh Morrison (NCAR), Jen Kay (NCAR), Chuck Bardeen (NCAR), Jason English (NCAR), Lin Su (NCAR), Christina McClusky (NCAR), Margaret Duffy (NCAR), Shiv Priyam Raghuraman (NCAR)

PUBLICATIONS

First Author Publications Submitted

Gettelman, Andrew, Rainbows and Climate Change: A tutorial on climate model diagnostics and parameterization, submitted to Geosci. Model Dev., 2023

First Author Publications in Press

Scientific Publications

213. Florindo, F., Acocella, V., Carlton, A. M., D'Odorico, P., Duan, Q., Gettelman, A., et al. (2023). 60 years and beyond of Reviews of Geophysics. Reviews of Geophysics, 61, e2023RG000807. https://doi.org/10.1029/2023RG000807

212. Gettelman, Andrew, Hugh Morrison, Trude Eidhammer, Katherine Thayer-Calder, Jian Sun, Richard Forbes, Zachary McGraw, Jiang Zhu, Trude Storelvmo, and John Dennis. 2023. "Importance of Ice Nucleation and Precipitation on Climate with the Parameterization of Unified Microphysics Across Scales Version 1 (PUMASv1)." *Geoscientific Model Development* 16 (6): 1735–54. https://doi.org/10.5194/gmd-16-1735-2023.

211. Christina S. McCluskey, Andrew Gettelman, Charles G. Bardeen, Paul J. DeMott, Kathryn A. Moore, Sonia M. Kreidenweis, Thomas C. J. Hill, Kevin R. Barry, Cynthia H. Twohy, Darin W. Toohey, Bryan Rainwater , Jorgen B. Jensen, John M. Reeves, Simon P. Alexander, and Greg M. McFarquhar Simulating Southern Ocean Aerosol and Ice Nucleating Particles in the Community Earth System Model Version 2, J. Geophys. Res. Atmos. doi:10.1029/2022JD036955, 2023

210. Huang, Xingying, Andrew Gettelman, William C. Skamarock, Peter Hjort Lauritzen, Miles Curry, Adam Herrington, John T. Truesdale, and Michael Duda, Advancing precipitation prediction using a new-generation storm-resolving model framework – SIMA-MPAS (V1.0): a case study over the western United States, Geosci. Model Dev., 15, 8135–8151, 2022, doi: 10.5194/gmd-15-8135-2022

209. A. Herrington, P. Lauritzen, W. Lipscomb, M. Lofverstrom, A. Gettelman and M. Taylor. Impact of grids and dynamical cores in CESM2.2 on the surface mass balance of the Greenland Ice Sheet, in press, J. Advances Modeling Earth Systems, 2022 doi: 10.1029/2022MS003192

208. Järvinen, Emma, Christina S. McCluskey, Fritz Waitz, Martin Schnaiter, Aaron Bansemer, Charles G. Bardeen, Andrew Gettelman, et al. 2022. "Evidence for Secondary Ice Production in Southern Ocean Maritime Boundary Layer Clouds." Journal of Geophysical Research: Atmospheres 127 (16): e2021JD036411. https://doi.org/10.1029/2021JD036411.

207. Stephens, Graeme L., Maria Z. Hakuba, Seiji Kato, Andrew Gettleman, Jean-Louis Dufresne, Timothy Andrews, Jason N. S. Cole, Ulrika Willem, and Thorsten Mauritsen. "The Changing Nature of Earth's Reflected Sunlight." Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences 478, no. 2263 (July 27, 2022): 20220053. https://doi.org/10.1098/rspa.2022.0053.

206. Hu, I-Kuan, Brian E. Mapes, Stefan N. Tulich, Richard B. Neale, Andrew Gettelman, and Kevin A. Reed. "Idealized Simulations of the Tropical Climate and Variability in the Single Column Atmosphere Model (SCAM): Radiative-Convective Equilibrium." Journal of Advances in Modeling Earth Systems 14, no. 2 (2022): e2021MS002826. https://doi.org/10.1029/2021MS002826.

205. Harrop, Bryce E., Michael S. Pritchard, Hossein Parishani, Andrew Gettelman, Samson Hagos, Peter H. Lauritzen, L. Ruby Leung, Jian Lu, Kyle G. Pressel, and Koichi Sakaguchi. "Conservation of Dry

Air, Water, and Energy in CAM and Its Potential Impact on Tropical Rainfall." *Journal of Climate* 35, no. 9 (May 1, 2022): 2895–2917. https://doi.org/10.1175/JCLI-D-21-0512.1.

204. Ma, Po-Lun, Bryce E. Harrop, Vincent E. Larson, Richard B. Neale, Andrew Gettelman, Hugh Morrison, Hailong Wang, et al. "Better Calibration of Cloud Parameterizations and Subgrid Effects Increases the Fidelity of the E3SM Atmosphere Model Version 1." Geoscientific Model Development 15, no. 7 (April 7, 2022): 2881–2916. https://doi.org/10.5194/gmd-15-2881-2022.

203. Gettelman, Andrew, Alan J. Geer, Richard M. Forbes, Greg R. Carmichael, Graham Feingold, Derek J. Posselt, Graeme L. Stephens, Susan C. van den Heever, Adam C. Varble, and Paquita Zuidema. "The Future of Earth System Prediction: Advances in Model-Data Fusion." *Science Advances* 8, no. 14 (2022): eabn3488. https://doi.org/10.1126/sciadv.abn3488.

202. Diamond, Michael S., Andrew Gettelman, Matthew D. Lebsock, Allison McComiskey, Lynn M. Russell, Robert Wood, and Graham Feingold. "Opinion: To Assess Marine Cloud Brightening's Technical Feasibility, We Need to Know What to Study—and When to Stop." *Proceedings of the National Academy of Sciences* 119, no. 4 (January 25, 2022). https://doi.org/10.1073/pnas.2118379119.

201. Christensen, Matthew W., Andrew Gettelman, Jan Cermak, Guy Dagan, Michael Diamond, Alyson Douglas, Graham Feingold, et al. "Opportunistic Experiments to Constrain Aerosol Effective Radiative Forcing." Atmospheric Chemistry and Physics 22, no. 1 (January 17, 2022): 641–74. https://doi.org/10.5194/acp-22-641-2022.

200. Fung, K. M., C. L. Heald, J. H. Kroll, S. Wang, D. S. Jo, A. Gettelman, Z. Lu, et al. "Exploring DMS Oxidation and Implications for Global Aerosol Radiative Forcing." *Atmospheric Chemistry and Physics* 2021 (2021): 1–58. https://doi.org/10.5194/acp-2021-782.

199. Yang, Ching An, Minghui Diao, Andrew Gettelman, Kai Zhang, Jian Sun, Greg McFarquhar, and Wei Wu. "Ice and Supercooled Liquid Water Distributions Over the Southern Ocean Based on In Situ Observations and Climate Model Simulations." Journal of Geophysical Research: Atmospheres 126, no. 24 (2021): e2021JD036045. https://doi.org/10.1029/2021JD036045.

198. McCoy, Isabel L., Christopher S. Bretherton, Robert Wood, Cynthia H. Twohy, Andrew Gettelman, Charles G. Bardeen, and Darin W. Toohey. "Influences of Recent Particle Formation on Southern Ocean Aerosol Variability and Low Cloud Properties." *Journal of Geophysical Research: Atmospheres* 126, no. 8 (2021): e2020JD033529. https://doi.org/10.1029/2020JD033529.

197. Martin, M. A., Alcaraz Sendra, O., Bastos, A., Bauer, N., Bertram, C., Blenckner, T., Bowen, K., Brando, P. M., Rudolph, T.B., Büchs, M., Bustamante, M., Chen, D., Cleugh, H., Dasgupta, P., Denton, F., Donges, J. F., Donkor, F.K., Duan, H., Duarte, C. M., Ebi, K. L., Edwards, C.M., Engel, A., Fisher, E., Fuss, S., Gaertner, J., Gettelman, A., Girardin, C. A.J., Golledge, N. R., Green, J. F., Grose, M. R., Hashizume, M., Hebden, S., Hepach, H., Hirota, M., Hsu, H.H., Kojima, S., Lele, S., Lorek, S., Lotze, H. K., Matthews, H. D., McCauley, D., Mebratu, D., Mengis, N., Nolan, R. H., Pihl, E., Rahmstorf, S., Redman, A., Reid, C. E., Rockström, J., Rogelj, J., Saunois, M., Sayer, L., Schlosser, P., Sioen, G.B., Spangenberg, J.H., Stammer, D., Sterner, T.N.S., Stevens, N., Thonicke, K., Tian, H., Winkelmann, R., Woodcock, J. (2021). Ten new insights in climate science 2021: a horizon scan. Global Sustainability, 4(e25), 1–20. https://doi.org/10.1017/sus.2021.25

196. Craig, Cheryl, Julio Bacmeister, Patrick Callaghan, Brian Eaton, Andrew Gettelman, and S. Goldhaber. "CAM6.3 User's Guide." Technical Note. NCAR/UCAR, 2021. https://doi.org/10.5065/Z953-ZC95.

195. Gettelman, A., G. R. Carmichael, G. Feingold, A. M. Da Silva, and S. C. van den Heever. 2021. "Confronting Future Models with Future Satellite Observations of Clouds and Aerosols." Bulletin of

the American Meteorological Society 102 (8): E1557–62. https://doi.org/10.1175/BAMS-D-21-0029.1.

194. Gettelman, Andrew, Chieh-Chieh Chen, and Charles G. Bardeen. 2021. "The Climate Impact of COVID-19-Induced Contrail Changes." Atmospheric Chemistry and Physics 21 (12): 9405–16. https://doi.org/10.5194/acp-21-9405-2021.

193. Yip, Jackson, Minghui Diao, Tyler Barone, Israel Silber, and Andrew Gettelman. 2021. "Evaluation of the CAM6 Climate Model Using Cloud Observations at McMurdo Station, Antarctica." Journal of Geophysical Research: Atmospheres 126 (16): e2021JD034653. https://doi.org/10.1029/2021JD034653.

192. Gettelman, A., D. J. Gagne, C.-C. Chen, M. W. Christensen, Z. J. Lebo, H. Morrison, and G. Gantos. "Machine Learning the Warm Rain Process." Journal of Advances in Modeling Earth Systems 13, no. 2 (2021): e2020MS002268. https://doi.org/10.1029/2020MS002268.

191. Gettelman, A., R. Lamboll, C. G. Bardeen, P. M. Forster, and D. Watson-Parris. "Climate Impacts of COVID-19 Induced Emission Changes." Geophysical Research Letters 48, no. 3 (2021): e2020GL091805. https://doi.org/10.1029/2020GL091805.

190. McFarquhar, Greg M., Chris Bretherton, Roger Marchand, Alain Protat, Paul J. DeMott, Simon P. Alexander, Andrew Gettelman, Greg C. Roberts, et al. "Observations of Clouds, Aerosols, Precipitation, and Surface Radiation over the Southern Ocean: An Overview of CAPRICORN, MARCUS, MICRE and SOCRATES." Bulletin of the American Meteorological Society 1, no. aop (November 30, 2020): 1–92. https://doi.org/10.1175/BAMS-D-20-0132.1.

189. Meehl, Gerald A., Julie M. Arblaster, Susan Bates, Jadwiga H. Richter, Claudia Tebaldi, Andrew Gettelman, Brian Medeiros, et al. "Characteristics of Future Warmer Base States in CESM2." *Earth and Space Science* 7, no. 9 (2020): e2020EA001296. https://doi.org/10.1029/2020EA001296.

188. Zhou, X., R. Atlas, I. L. McCoy, C. S. Bretherton, C. Bardeen, A. Gettelman, P. Lin, and Y. Ming, Evaluation of cloud and precipitation simulations in CAM6 and AM4 using observations over the Southern Ocean, Earth and Space Science, doi: 10.1029/2020EA001241, 2020

187. Atlas, R., C. S. Bretherton, P. N. Blossey, A. Gettelman, C. Bardeen, P. Lin and Y. Ming, How well do large-eddy simulations and global climate models represent observed boundary layer structures and low clouds over the summertime Southern Ocean?, CESM2 J. Advances Modeling Earth Sys. 2020, doi: : 10.1029/2020JD 002205

186. J. T. Bacmeister C. Hannay B. Medeiros A. Gettelman R. Neale H. B. Fredriksen W. H. Lipscomb I. Simpson D. A. Bailey M. Holland K. Lindsay B. Otto-Bliesner, CO2 increase experiments using the Community Earth System Model (CESM): Relationship to climate sensitivity and comparison of CESM1 to CESM2 J. Advances Modeling Earth Sys. 2020, doi:10.1029/2020JD002120

185. Lee, D. S., D. W. Fahey, A. Skowron, M. R. Allen, U. Burkhardt, Q. Chen, S. J. Doherty, S. Freeman, P. M. Forster, J. Fuglestvedt, A. Gettelman, R. R. Leon, L. L. Lim, M. T. Lund, R. J. Millar, B. Owen, J. E. Penner, G. Pitari, L. Wilcox "The Contribution of Global Aviation to Anthropogenic Climate Forcing for 2000 to 2018." Atmospheric Environment 244 (2020): 117834. https://doi.org/10.1016/j.atmosenv.2020.117834.

184. Gettelman, Andrew, Charles Bardeen, Christina S. McCluskey, Emma Järvinen, Jeffrey Stith, and Chris Brethenron. "Simulating Observations of Southern Ocean Clouds and Implications for Climate." J. Geophys. Res, 2020, doi: 10.1029/2020JD032619

183. Louisa K. Emmons, Rebecca H. Schwantes, John J. Orlando, Geoff Tyndall, Douglas Kinnison, Jean-François Lamarque, Daniel Marsh, Michael J. Mills, Simone Tilmes, Charles Bardeen, Rebecca R. Buchholz, Andrew Conley, Andrew Gettelman, Rolando Garcia, Isobel Simpson, Donald R. Blake, Simone Meinardi, Gabrielle Pétron, The Chemistry Mechanism in the Community Earth System Model version 2 (CESM2), J. Adv. Modeling Earth Sys., doi:10.1029/2019JD001882, 2020

182. DuVivier, Alice K., Marika M. Holland, Jennifer E. Kay, Simone Tilmes, Andrew Gettelman, and David A. Bailey. “Arctic and Antarctic Sea Ice Mean State in the Community Earth System Model Version 2 and the Influence of Atmospheric Chemistry.” Journal of Geophysical Research: Oceans 125, no. 8 (2020): e2019JC015934. https://doi.org/10.1029/2019JC015934.

181. Heymsfield, A. H., C. Drews, C. C. Chen and A. Gettelman, Contributions of the Liquid and Ice Phases to Global Surface Precipitation: Observations and Global Climate Modeling, J. Atmos. Sci. (2020) 77 (8): 2629–2648. doi:10.1175/JAS-D-19-0352.1

180. B. Berry; G. Mace; A. Gettelman ,Using A-Train Observations to Evaluate East Pacific Cloud Occurrence and Radiative Effects in the Community Atmosphere Model, J. Climate (2020) 33 (14): 6187–6203, doi:10.1175/JCLI-D-19-0870.1

179. N. G. Loeb, H. Wang, R, Allan, T. Andrews, K, Armour, J. N. S. Cole, J.-L. Dufresne, P. Forster, A. Gettelman, T. Mauritsen, Y. Ming, D. Paynter, C. Proistosescu, M. F. Stuecker, U. Willén1, K, Wyser, New Generation of Climate Models Track Recent Unprecedented Changes in Earth's Radiation Budget Observed by CERES, Geophys. Res. Lett., v47 n 5, doi:10.1029/ 2019GL086705, 2020

178. I. H. H. Karset, A. Gettelman, T. Storelvmo, K. Alterskjær, T. K. Berntsen, Exploring Impacts of Size-Dependent Evaporation and Entrainement in a global model, J. Geophys. Res. Atmos., v125, n4, doi: 0.1029/2019JD031817, 2020

177. Y.-H. Kuo, J. D. Neelin, C.-C. Chen, W.-T. Chen, L. J. Donner, A. Gettelman, X. Jiang, K.-T. Kuo, E. Maloney, C. R. Mechoso, Y. Ming, K. A. Schiro, C. J. Seman, H.-M. Wu, AND M. Zhao, Convective Transition Statistics over Tropical Oceans for Climate Model Diagnostics: GCM Evaluation, J. Atmos Sci., v77, n1 doi: 10.1175/JAS-D-19-0132.1, 2020

176: Danabasoglu, G. et al, The Community Earth System Model version 2 (CESM2), J. Adv. Modeling Earth Systems, v12, n2, doi: 10.1029/2019MS001916, 2020

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