

DAVID ANTHONY BAILEY

Citizenship: Canada and U.S.A.

Current Position

Associate Scientist IV, National Center for Atmospheric Research

Education

Ph.D. 2001: Astrophysical, Planetary, and Atmospheric Sciences / Program in Atmospheric and Oceanic Sciences, University of Colorado, Boulder, CO. (Advisor: Amanda H. Lynch)

M.Sc. 1993: Oceanography/Applied Mathematics, University of British Columbia, Vancouver, B.C. (Advisor: William W. Hsieh)

B.Math. 1991: Applied Mathematics/Computer Science Minor, University of Waterloo, Waterloo, Ontario.

Management and Service Experience

2019 – present: Associate Editor for GRL

2016 – present: Led the Community Aspects Task Team for the CICE Consortium and participated in a number of the other task teams.

2006 – present: Served as the Community Liaison for the Polar Climate Working Group of the CESM.

2017 – 2019: Supervised an Associate Scientist, Alice DuVivier.

2017 – 2023: Served on the Model Component Liaison committee for the Earth System Prediction Capability project (NOAA).

2016 – 2021: Served on PhD committee for Abigail Ahlert at University of Colorado.

2015 – 2016: Organized the CGD Seminar.

2012, 2017: Led the CESM Tutorial.

2011 – 2015: Served as chair of the ACADIS Data Advisory Committee.

Research Experience

Associate Scientist, National Center for Atmospheric Research (2006 - present):

- supervised Advanced Study Program and other student interns.
- collaborated on outside NSF sponsored projects
- investigated high-resolution CESM experiments to assess sea ice and high-latitude aspects
- validated model simulations against satellite and other observational products
- responsible for the maintenance and development of the CESM sea ice model component (CICE)
- perform experiments of interest to the CESM Polar Climate Working Group and greater CESM community

- study impact of physical parameterizations on the simulation of sea ice and the coupled climate system
- collaborated with numerous PCWG/CESM and CICE Consortium scientists

Research Scientist, George Mason University / Center for Ocean Land Atmosphere Studies (2004 - 2005):

- contributed to the development of the Poseidon hybrid-coordinate ocean model
- assessed the skill of tropical Pacific upper-ocean temperature simulation in nearly-global medium resolution experiments using the Poseidon ocean model
- studied the conservation of dense overflow water in a high resolution global Poseidon simulation

Postdoctoral Research Associate, University of Washington (2000 - 2003):

- analyzed a coupled ice-ocean model of the Arctic and North Atlantic Oceans
- studied atmospheric and oceanic variability and mechanisms behind the variability

Graduate Research Assistant, University of Colorado (1996 - 2000):

- implemented a regional climate system model for the Antarctic and Southern Ocean
- investigated the model sensitivity and applicability to study Antarctic climate
- studied the role of coastal atmospheric and oceanic processes in driving an open-ocean polynya
- participant in North Water Polynya project, Ellesmere Island, Canada (1998):

Ph.D. Candidate, University of Tasmania, Australia (1996):

- continued research on Western Arctic and Alaskan regional climate simulations

Research Programmer, Geophysical Institute, University of Alaska (1993 - 1996):

- maintained and developed the Arctic Region Climate System Model (ARCSyM)
- investigated the atmospheric forcing of the St. Lawrence Island polynya
- researched climate system model sensitivity in the Western Arctic and Alaska regions
- cooperated with Fairbanks National Weather service office on the implementation of NCAR MM5 operational weather forecasting and assimilation model
- performed UNIX system administration

Graduate Research Assistant, University of British Columbia (1991 - 1993):

- researched the use of a regional ocean model in a data assimilation scheme

Co-op Student, Canadian Ice Service, Environment Canada (1990, 1991)

- maintained and developed an operational model for sea ice forecasting
- incorporated satellite and aircraft observations for model validation

Technical Skills

- Extensive experience with Fortran 77/90/95.
- Programming in massively parallel environments.
- Familiarity with MPI/OpenMP parallelization.
- Very proficient in analysis/visualization tools such as NCL, Matlab, IDL, and Python.

- Experienced in LINUX/UNIX environments and shell/perl programming.

Currently Funded Projects

NNA Track 1: Collaborative Research: Navigating Convergent Pressures on Arctic Resources.

NSF OPP: Collaborative Research: Sea ice-ocean exchange of Arctic microplastics: linking small scales to the large-scale system.

Refereed Publications

Lee, W. R., MacMartin, D. G., Visioni, D., Kravitz, B., Chen, Y., Moore, J. C., Leguy, G., Lawrence, D. M., and Bailey, D. A. (2023). High-latitude stratospheric aerosol injection to preserve the Arctic. *Earth's Future*, 11, e2022EF003052. <https://doi.org/10.1029/2022EF003052>.

N. W. Cherukuru, D. A. Bailey, T. Fourment, B. Hatheway, M. M. Holland and M. Rehme, "Beyond Visuals: Examining the Experiences of Geoscience Professionals With Vision Disabilities in Accessing Data Visualizations," 2022 IEEE Visualization and Visual Analytics (VIS), Oklahoma City, OK, USA, 2022, pp. 160-164, doi: 10.1109/VIS54862.2022.00041.

Kay, J. E., DeRepentigny, P., Holland, M. M., Bailey, D. A., DuVivier, A. K., Blanchard-Wrigglesworth, E., et al. (2022). Less surface sea ice melt in the CESM2 improves Arctic sea ice simulation with minimal non-polar climate impacts. *Journal of Advances in Modeling Earth Systems*, 14, e2021MS002679. <https://doi.org/10.1029/2021MS002679>.

Smith, M. M., Holland, M. M., Petty, A. A., Light, B., & Bailey, D. A. (2022). Effects of increasing the category resolution of the sea ice thickness distribution in a coupled climate model on Arctic and Antarctic sea ice mean state. *Journal of Geophysical Research: Oceans*, 127, e2022JC019044. <https://doi.org/10.1029/2022JC019044>.

DeRepentigny, P., A. Jahn, M. M. Holland, J. E. Kay, J. Fasullo, J. F. Lamarque, S. Tilmes, C. Hannay, M. J. Mills, D. A. Bailey, and A. P. Barrett, 2022: Enhanced simulated early 21st century Arctic sea ice loss due to CMIP6 biomass burning emissions. *Science Advances* 8 (30), <https://doi.org/10.1126/sciadv.abo2405>.

Richter, J. H., Visioni, D., MacMartin, D. G., Bailey, D. A., Rosenbloom, N., Dobbins, B., Lee, W. R., Tye, M., and Lamarque, J.-F.: Assessing Responses and Impacts of Solar climate intervention on the Earth system with stratospheric aerosol injection (ARISE-SAI): protocol and initial results from the first simulations, *Geosci. Model Dev.*, 15, 8221–8243, <https://doi.org/10.5194/gmd-15-8221-2022>, 2022.

Li, X., Lynch, A.H., Bailey, D.A., Stephenson, S. R., and S. Veland. The impact of black carbon emissions from projected Arctic shipping on regional ice transport. *Clim Dyn* 57, 2453–2466 (2021). <https://doi-org.cuucar.idm.oclc.org/10.1007/s00382-021-05814-9>.

DuVivier, A. K., Holland, M. M., Landrum, L., Singh, H. A., Bailey, D. A., & Maroon, E. A. (2021). Impacts of sea ice mushy thermodynamics in the Antarctic on the coupled Earth system. *Geophysical Research Letters*, 48, e2021GL094287. <https://doi.org/10.1029/2021GL094287>.

Bailey, D. A., M. M. Holland, A. K. DuVivier, E. C. Hunke, A. K. Turner, 2020: Impact of a New Sea Ice Thermodynamic Formulation in the CESM2 sea ice component. *J. Adv. Model. Earth Syst.*, e2020MS002154, doi:10.1029/2020MS002154

Singh, H., Landrum, L., Holland, M., Bailey, D., & DuVivier, A., 2020: An overview of the Antarctic Sea Ice in the Community Earth System Model Version 2, part 1: Analysis of the seasonal cycle

in the context of sea ice thermodynamics and coupled atmosphere-ocean-ice processes. *Journal of Advances in Modeling Earth Systems*, e2020MS002143, <https://doi.org/10.1029/2020MS002143>

DuVivier, A. K., M. M. Holland, J. E. Kay, S. Tilmes, A. Gettelman, D. A. Bailey, 2020: Arctic and Antarctic Sea Ice Mean State in the Community Earth System Model Version 2 and the Influence of Atmospheric Chemistry. *J. Geophys. Res. Oceans*, 125(8), e2019JC015934, doi:10.1029/2020MS002154

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, 2020: CO2 increase experiments using the Community Earth System Model (CESM): Relationship to climate sensitivity and comparison of CESM1 to CESM2. *Journal of Advances in Modeling Earth Systems*, e2020MS002120, <https://doi.org/10.1029/2020MS002120>

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Roach, L. A., J. Dörr, C. R. Holmes, F. Massonnet, E. W. Blockley, D. Notz, T. Rackow, M. N. Raphael, S. P. O'Farrell, D. A. Bailey, C. M. Bitz, 2020: Antarctic sea ice area in CMIP6. *Geophys. Res. Lett.* **47**(10), e2019GL086729, doi: 10.1029/2019GL086729.

Danabasoglu, G., Lamarque, J. -F., Bachmeister, J., Bailey, D. A., DuVivier, A. K., Edwards, J., Emmons, L. K., Fasullo, J., Garcia, R., Gettelman, A., Hannay, C., Holland, M. M., Large, W. G., Lawrence, D. M., Lenaerts, J. T. M., Lindsay, K., Lipscomb, W. H., Mills, M. J., Neale, R., Oleson, K. W., Otto-Bliesner, B., Phillips, A. S., Sacks, W., Tilmes, S., van Kampenhout, L., Vertenstein, M., Bertini, A., Dennis, J., Deser, C., Fischer, C., Fox-Kemper, B., Kay, J. E., Kinnison, D., Kushner, P. J., Long, M. C., Mickelson, S., Moore, J. K., Nienhouse, E., Polvani, L., Rasch, P. J., Strand, W. G. (2020) The Community Earth System Model version 2 (CESM2). *Journal of Advances in Modeling Earth Systems*, 12, <https://doi.org/10.1029/2019MS001916>.

Chang, P., Zhang, S., Danabasoglu, G., Yeager, S. G., Fu, H., Wang, H., Castruccio, F. S., Chen, Y., Edwards, J., Fu, D., Jia, Y., Laurindo, L., Liu, X., Rosenbloom, N., Small, R. J., Xu, G., Zheng, Y., Zhang, Q., Backmeister, J., Bailey, D. A., et al. (2020). An unprecedented set of high-resolution earth system simulations for understanding multiscale interactions in climate variability and change. *Journal of Advances in Modeling Earth Systems*, 12, e2020MS002298. <https://doi.org/10.1029/2020MS002298>.

Hecht M., Veneziani, M., Weijer, W., Kravitz, B., Burrows, S., Comeau, D., Hunke, E., Jeffery, N., Urrego-Blanco, J., Wang, H., Wang, S. Zhang, J., Bailey, D., Mills, C., Rasch, P., and Urban, N. (2019). E3SMv0-HiLAT: A modified climate system model targeted for the study of high-latitude processes. *Journal of Advances in Modeling Earth Systems*, 11, 2814–2843. <https://doi.org/10.1029/2018MS001524>

Brady, E., Stevenson, S., Bailey, D., Liu, Z., Noone, D., Nusbaumer, J., et al. (2019). The connected isotopic water cycle in the Community Earth System Model version 1. *Journal of Advances in Modeling Earth Systems*, 11, 2547–2566. <https://doi.org/10.1029/2019MS001663>.

Gettelman, A., Hannay, C., Bacmeister, J. T., Neale, R. B., Pendergrass, A. G., Danabasoglu, G., et al. (2019). High climate sensitivity in the Community Earth System Model Version 2 (CESM2). *Geophysical Research Letters*, 46, 8329–8337. <https://doi.org/10.1029/2019GL083978>.

Holland, M. M., L. Landrum, D. Bailey, and S. Vavrus, 2019: Changing Seasonal Predictability of Arctic Summer Sea Ice Area in a Warming Climate. *J. Climate*, 32, 4963–4979, <https://doi.org/10.1175/JCLI-D-19-0034.1>.

- Huang, Y., X. Dong, D. A. Bailey, M. M. Holland, B. Xi, A. K. DuVivier, J. E. Kay, L. L. Landrum, Y. Deng, 2019: Thicker Clouds and Accelerated Arctic Sea Ice Decline: The Atmosphere-Sea Ice Interactions in Spring. *Geophys. Res. Lett.*, 46(12), 6980--6989, doi:10.1029/2019GL082791.
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- Roberts, A. F., E. C. Hunke, R. Allard, D. A. Bailey, A. P. Craig, J.-F. Lemieux, M. D. Turner, 2018: Quality control for community-based sea-ice model development, *Phil. Trans. R. Soc. A*, 376, 2129, doi: 10.1098/rsta.2017.0344.
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- Wang, Q., M. Ilicak, R. Gerdes, H. Drange, Y. Aksenov, D. A. Bailey, et al. 2016: An assessment of the Arctic Ocean in a suite of interannual CORE-II simulations. Part II: Liquid freshwater. *Ocean Modelling*, 99, 86-109. doi: 10.1016/j.ocemod.2015.12.009.
- Wang, Q., M. Ilicak, R. Gerdes, H. Drange, Y. Aksenov, D. A. Bailey, et al. 2016: An assessment of the Arctic Ocean in a suite of interannual CORE-II simulations. Part I: Sea ice and solid freshwater. *Ocean Modelling*, 99, 110-132. doi: 10.1016/j.ocemod.2015.12.008.
- Downes, S. M., R. Farnetti, P. Uotila, S. M. Griffies, S. J. Marsland, D. Bailey, et al. 2015: An assessment of Southern Ocean water masses and sea ice during 1988–2007 in a suite of interannual CORE-II simulations. *Ocean Modelling*, 94, 67-94. doi: 10.1016/j.ocemod.2015.07.022.
- Fine, E. C., F. O. Bryan, W. G. Large, and D. A. Bailey, 2015: An initial estimate of the global distribution of diurnal variation in sea surface salinity. *J. Geophys. Res. Oceans*, 120(5), 3211-3228. doi:10.1002/2014JC010483.
- Small, JR, J Bacmeister, D Bailey, A Baker, S Bishop, F Bryan, J Caron, J Dennis, P Gent, H-M Hsu, M Jochum, D Lawrence, E Munoz, P diNezio, T Scheitlin, B Tomas, J Tribbia, Y-H Tseng, M Vertenstein, 2014: A new synoptic-scale resolving global climate simulation using the Community Earth System Model, *JAMES*, 6(4), 1065-1094. doi:10.1002/2014MS000363.
- Wang, S, D Bailey, K Lindsay, J K Moore, and M Holland, 2014: Impact of sea ice on the marine iron cycle and phytoplankton productivity, *Biogeosciences*, 11, 4713-4731. doi:10.5194/bg-11-4713-2014.
- Craig, AP, S Mickelson, E C Hunke, and D A Bailey, 2014: Improved parallel performance of the CICE model in CESM1. *International Journal of High Performance Computing Applications*, 29(2), 154-165. doi:10.1177/1094342014548771.
- Danabasoglu, G., S. G. Yeager, D. Bailey, and coauthors, 2014: North Atlantic simulations in Coordinated Ocean-ice Reference Experiments phase II (CORE-II). Part I: Mean states. *Ocean Modelling*, 73, 76-107. doi:10.1016/j.ocemod.2013.10.005
- Kay, J. E., M. M. Holland, C. Bitz, E. Blanchard-Wrigglesworth, A. Gettelman, A. Conley, and D. A. Bailey, 2012: The influence of local feedbacks and northward heat transport on the equilibrium Arctic climate response to increased greenhouse gas forcing in coupled climate models, *J. Climate*, 25, 5433-5450. doi:10.1175/JCLI-D-11-00622.1.
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Bitz, C. M., K. M. Shell, P. R. Gent, D. A. Bailey, G. Danabasoglu, K. C. Armour, M. M. Holland, and J. T. Kiehl, 2012: Climate Sensitivity in the Community Climate System Model Version 4. *J. Climate*, 25, 3053-3070. doi:10.1175/JCLI-D-11-00290.1.

Vavrus, S. J., M. M. Holland, A. Jahn, D. A. Bailey, and B. A. Blazey, 2012: 21st-Century Arctic climate change in CCSM4. *J. Climate*, 25, 2696-2710. doi:10.1175/JCLI-D-11-00220.1.

Jochum, M., A. Jahn, S. Peacock, D. A. Bailey, J. T. Fasullo, J. E. Kay, S. Levis, and B. Otto-Bliesner, 2012: True to Milankovitch: Glacial Inception in the new Community Climate System Model. *J. Climate*, 25, 2226-2239. doi:10.1175/JCLI-D-11-00044.1.

Jahn, A., K. Sterling, M. M. Holland, J. E. Kay, J. A. Maslanik, C. M. Bitz, D. A. Bailey, J. Stroeve, E. C. Hunke, W. H. Lipscomb, D. Pollak, 2012: Late 20th century simulation of Arctic sea ice and ocean properties in CCSM. *J. Climate*, 25, 1431-1452. doi:10.1175/JCLI-D-11-00201.1.

Holland, M. M., D. A. Bailey, B. P. Briegleb, B. Light, and E. C. Hunke, 2012: Improved sea ice shortwave radiation physics in CCSM4: The impact of melt ponds and black carbon. *J. Climate*, 25, 1413-1430. doi:10.1175/JCLI-D-11-00078.1.

Miller, G. H., A. Geirsdottir, Y. Zhong, D. J. Larsen, B. L. Otto-Bliesner, M. M. Holland, D. A. Bailey, K. A. Refsnider, S. J. Lehman, J. R. Southon, C. Anderson, H. Bjornsson, T. Thordarson, 2012: Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks. *Geophys. Res. Lett.*, 39, L02708, doi:10.1029/2011GL050168.

Zhong, Y., G. H. Miller, B. L. Otto-Bliesner, M. M. Holland, D. A. Bailey, D. P. Schneider, and A. Geirsdottir, 2011: Centennial-scale climate change from decadal paced explosive volcanism: a coupled sea ice-ocean mechanism. *Climate Dynamics*, 37(11-12), 2373-2387, doi:10.1007/s00382-010-0967-z.

Vavrus, S., M. Holland, and D. Bailey, 2011: Changes in Arctic clouds during intervals of rapid sea ice loss. *Climate Dynamics*, 36(7-8), 1475-1489, doi: 10.1007/s00382-010-0816-0.

Holland, M. M., D. A. Bailey, and S. Vavrus, 2011: Inherent sea ice predictability in the rapidly changing Arctic environment of the Community Climate System Model, version 3. *Climate Dynamics*, 36(7-8), 1239-1253, doi: 10.1007/s00382-010-0792-4.

Amstrup, S. C., E. T. DeWeaver, D. C. Douglas, B. G. Marcot, G. M. Durner, C. M. Bitz & and D. A. Bailey, 2010. Greenhouse gas mitigation can reduce sea-ice loss and increase polar bear persistence. *Nature* 468, 955–958. doi:10.1038/nature09653.

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Bailey, D. A., and A. H. Lynch, 2000: Development of an Antarctic Regional Climate System Model: Part 1. Sea Ice and Large-Scale Circulation, *J. Climate*, 13(8), 1337-1350.

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