

Daniel M. Westervelt, PhD

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Research and Teaching Interests

Air quality, climate change, atmospheric chemistry, global atmospheric modeling, particulate matter, aerosol-climate interactions, aerosol health effects, environmental engineering and science

Education

- Ph.D. Civil and Environmental Engineering. Carnegie Mellon University. Pittsburgh, PA. May 2013
Advisor: Peter Adams
- M.S. Civil and Environmental Engineering. Carnegie Mellon University, Pittsburgh, PA. May 2009
- B.S. Civil Engineering. Purdue University. West Lafayette, IN. May 2008.

Funded research grants

(Pending) Department of State, USA. “Collaborative Research: Accelnet: Clean Air Monitoring and Solutions Network”. \$300,000 Lead PI.

(Pending) National Science Foundation. “Collaborative Research: Accelnet: Clean Air Monitoring and Solutions Network”. \$2,000,000. Lead PI.

(Pending) Department of Energy Atmospheric Science Research Program. “Combining empirical data and atmospheric modeling to understand the competing effects of absorbing aerosols on clouds”. \$500,000. Institutional PI.

(Pending) USAID. “Clean Air Toolbox coalition: a scalable approach to improved air quality and capacity building in LMICs”. \$20,000,000. Co-PI.

Columbia University Provost’s Office. “Towards closing the air pollution data gap in sub-Saharan Africa through international collaboration and capacity building.” \$42,000. 7/1/2020 – 6/31/2022. Lead PI

Environmental Protection Agency. “Automated Model Reduction for Atmospheric Chemical Mechanisms”. \$462,025 Co-PI. 12/1/2020 – 11/30/2023.

Columbia University Data Science Institute. “Detecting and attributing spatiotemporal variations in sources of ground-level air pollution with a modeling testbed for integrating multiple noisy satellite datasets.” 1/1/2020 – 12/31/2021. \$200,000. Co-PI.

Columbia University Earth Institute. 12/1/2019 – 12/31/2020 “Clean air toolbox for cities initiative”. \$150,000. co PI

Columbia Center for Climate and Life. 7/1/2019 – 12/31/2022. “Towards the development of a real-time air pollution monitoring network in sub-Saharan Africa”. \$201,328. Lead PI

Industrial Economics, Inc. 2/1/2020 – 12/31/2020. “Data analysis of low cost air pollution monitors in a polluted neighborhood in Accra, Ghana”. \$20,000. Subcontract, Institutional PI.

Lamont-Doherty Earth Observatory, Columbia University. Columbia Climate Center. 2/1/2019-1/31/2021. “Development of an air pollution monitoring network in the megacity of Kinshasa, Democratic Republic of the Congo”. \$10,000. Lead PI

National Science Foundation, Atmospheric and Geospace Science (AGS). \$169,504. 9/1/18 – 9/31/20. “Local and Remote Regional Climate Responses to Regional Forcings from Short-Lived Climate Forcers”. Co-PI

National Science Foundation. Atmospheric and Geospace Science (AGS). \$602,918. 11/1/16 – 10/31/20 “Understanding Forced and Natural Asian Monsoon Variability and Change in Observations and CMIP5 Models.” Co-PI

NASA Atmospheric Chemistry, Modeling, Analysis and Prediction (ACMAP). \$748,955. 1/1/17 – 12/31/20. “Variability and trends in tropospheric oxidation: Interactions with regional air quality, global atmospheric composition, and climate”. Co-PI

Columbia University Global Policy Center. \$200,000. 6/1/16 – 5/31/18. “Assessing future Chinese air pollution impacts on mortality in China and the U.S.” Co-PI

Columbia University Earth Institute. \$15,000. 9/1/2015 – 12/19/2016. “Can satellite observations help us better understand the air quality problem in India?” Lead PI

Experience

Associate Research Scientist (primary appointment) Columbia University, Lamont-Doherty Earth Observatory	8/2015 - present
Science Collaborator (secondary appointment) NASA Goddard Institute for Space Studies (NASA GISS)	9/2016 - present
Air Quality Science Advisor United States Department of State Air Quality Monitoring program In Cooperation with the US EPA	11/2017 -present

Postdoctoral Research Associate in Science, Technology, and Environmental Policy

8/2013 – 8/2015

Princeton University and Geophysical Fluid Dynamics Lab (GFDL)

Advisor: Denise Mauzerall

Peer-reviewed Publications

Westervelt, D.M. ; You, Y.; Li, X.; Ting, M.; Lee, D.E.; and Ming, Y., 2020: "Relative importance of greenhouse gases, sulfate, organic carbon, and black carbon aerosol for South Asian monsoon rainfall changes". Accepted at Geophys. Res. Lett., --<https://pubs.giss.nasa.gov/abs/we09200d.html>

Westervelt, D. M., Mascioli, N. R., Fiore, A. M., Conley, A. J., Lamarque, J.-F., Shindell, D. T., Faluvegi, G., Previdi, M., Correa, G., and Horowitz, L. W.: Local and remote mean and extreme temperature response to regional aerosol emissions reductions, *Atmos. Chem. Phys.*, 20, 3009–3027, <https://doi.org/10.5194/acp-20-3009-2020>, 2020.

Baublitz, C.B, Fiore, A.M; Clifton, O.E.; Mao, J.; Li, J.; Correa, G., **Westervelt, D. M.**, Horowitz, L.W., Paulot, F.; Williams, A.P., (2020). Sensitivity of Tropospheric Ozone Over the Southeast USA to Dry Deposition. *Geophysical Research Letters*, 47, e2020GL087158.
<https://doi.org/10.1029/2020GL087158>

Amiri-Farahani, A., Allen, R.J., Li, King-Fai, Nabat, P., and **Westervelt, D.M.** A La Niña-like climate response to south African biomass burning aerosol in CESM simulations. Accepted in *JGR-Atmospheres*, 2020. <https://doi.org/10.1029/2019JD031832>

Allen, R. J., Turnock, S., Nabat, P., Neubauer, D., Lohmann, U., Olivie, D., Oshima, N., Michou, M., Wu, T., Zhang, J., Takemura, T., Schulz, M., Tsigaridis, K., Bauer, S. E., Emmons, L., Horowitz, L., Naik, V., van Noije, T., Bergman, T., Lamarque, J.-F., Zanis, P., Tegen, I., **Westervelt, D. M.**, Le Sager, P., Good, P., Shim, S., O'Connor, F., Akritidis, D., Georgoulias, A. K., Deushi, M., Sentman, L. T., Fujimori, S., and Collins, W. J.: Climate and air quality impacts due to mitigation of non-methane near-term climate forcers, *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2019-1209>, in review, 2020.

Malings, C., **Westervelt, D.M.**, Hauryliuk, A., Presto, A. A., Grieshop, A., Bittner, A., Beekmann, M., and Subramanian, R.: Application of Low-Cost Fine Particulate Mass Monitors to Convert Satellite Aerosol Optical Depth Measurements to Surface Concentrations in North America and Africa, *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2020-67>, in review, 2020.

Li, Xiaoqiong, Ting, Mingling, You, Yujia, Lee, Dong Eun, **Westervelt, D. M.** Ming, Yi., South Asian summer monsoon response to aerosol-forced sea surface temperatures. Vol 47, Issue 1. 2020
<https://doi.org/10.1029/2019GL085329>

Nicely, J. M., Duncan, B. N., Hanisco, T. F., Wolfe, G. M., Salawitch, R. J., Deushi, M., Haslerud, A. S., Jöckel, P., Josse, B., Kinnison, D. E., Klekociuk, A., Manyin, M. E., Marécal, V., Morgenstern, O., Murray, L. T., Myhre, G., Oman, L. D., Pitari, G., Pozzer, A., Quaglia, I., Revell, L. E., Rozanov, E., Stenke, A., Stone, K., Strahan, S., Tilmes, S., Tost, H., **Westervelt, D. M.**, and Zeng, G.: A machine learning examination of hydroxyl radical differences among model simulations for CCMI-1, *Atmos. Chem. Phys.*, 20, 1341–1361, <https://doi.org/10.5194/acp-20-1341-2020>, 2020

Westervelt, D.M., Ma, C.T., He, M.Z., Fiore, A.M., Kinney, P.L., Kioumourtzoglou, M.-A., Wang, S., Xing, J., Ding, D., Correa, G. Mid-21st century ozone air quality and health burden in China under emissions scenarios and climate change. *Environmental Research Letters*. 14, 2019, 074030, doi: <https://iopscience.iop.org/article/10.1088/1748-9326/ab260b>

Fanourgakis, G.S.; Kanakidou, M.; Nenes, A.; Bauer, S.E.; Bergman, T.; Carslaw, K.S.; Grini, A.; Hamilton, D.S.; Johnson, J.S.; Karydis, V.A.; Kirkevåg, A.; Kodros, J.K.; Lohmann, U.; Luo, G.; Makkonen, R.; Matsui, H.; Neubauer, D.; Pierce, J.R.; Schmale, J.; Stier, P.; Tsigaridis, K.; van Noije, T.; Wang, H.; Watson-Parris, D.; **Westervelt, D.M.**; Yang, Y.; Yoshioka, M.; Daskalakis, N.; Decesari, S.; Gysel Beer, M.; Kalivitis, N.; Liu, X.; Mahowald, N.M.; Myriokefalitakis, S.; Schroedner, R.; Sfakianaki, M.; Tsimpidi, A.P.; Wu, M.; and Yu, F., 2019: Evaluation of global simulations of aerosol particle number and cloud condensation nuclei, and implications for cloud droplet formation. *Atmos. Chem. Phys.*, doi:10.5194/acp-2018-1340

Westervelt, D. M., Conley, A. J., Fiore, A. M., Lamarque, J.-F., Shindell, D. T., Previdi, M., Mascioli, N. R., Faluvegi, G., Correa, G., and Horowitz, L. W.: Connecting regional aerosol emissions reductions to local and remote precipitation responses, *Atmos. Chem. Phys.*, 18, 12461-12475, <https://doi.org/10.5194/acp-18-12461-2018>, 2018.

Conley, A.J., **Westervelt, D.M.**, Lamarque, J.-F., Fiore, A.M., Shindell, D., Correa, G., Faluvegi, G., Horowitz, L.W. Multi-model surface temperature responses to removal of U.S. sulfur dioxide emissions. *J. Geophys Res.* 123, no. 5, 2773-2796, doi:10.1002/2017JD027411. 2018

Liu T., Marlier M.E., DeFries R.S., **Westervelt D.M.**, Xia K.R., Fiore A.M., Mickley L.J., Cusworth D.H., and Milly G. Seasonal impact of regional outdoor biomass burning on air pollution in three Indian cities: Delhi, Bengaluru, and Pune. *Atmos Environ* 172, 83-92, <https://doi.org/10.1016/j.atmosenv.2017.10.024>, 2018

Westervelt, D. M., A. J., Conley, A. M., Fiore, J.-F., Lamarque, D., Shindell, M., Previdi, G., Faluvegi, G., Correa, and L. W., Horowitz (2017), Multimodel precipitation responses to removal of U.S. sulfur dioxide emissions, *J. Geophys. Res. Atmos.*, 122, doi:10.1002/2017JD026756.

Westervelt, D.M., L.W. Horowitz, V. Naik, A.P.K. Tai, A.M. Fiore, D.L. Mauzerall, Quantifying PM2.5-meteorology sensitivities in a global climate model, *Atmospheric Environment*, ISSN 1352-2310, <http://dx.doi.org/10.1016/j.atmosenv.2016.07.040>, 2016

Westervelt, D. M., Horowitz, L. W., Naik, V., Golaz, J.-C., and Mauzerall, D. L.: Radiative forcing and climate response to projected 21st century aerosol decreases, *Atmos. Chem. Phys.*, 15, 12681-12703, doi:10.5194/acp-15-12681-2015, 2015

Pierce, J. R., **Westervelt, D. M.**, Atwood, S. A., Barnes, E. A., and Leaitch, W. R.: New-particle formation, growth and climate-relevant particle production in Egbert, Canada: analysis from 1 year of size-distribution observations, *Atmos. Chem. Phys.*, 14, 8647-8663, doi:10.5194/acp-14-8647-2014, 2014

Westervelt, D. M., Pierce, J. R., and Adams, P. J.: Analysis of feedbacks between nucleation rate, survival probability and cloud condensation nuclei formation, *Atmos. Chem. Phys.*, 14, 5577-5597, doi:10.5194/acp-14-5577-2014, 2014.

D'Andrea, S. D., Hakkinen, S. A. K., **Westervelt, D. M.**, Kuang, C., Levin, E. J. T., Kanawade, V. P., Leaitch, W. R., Spracklen, D. V., Riipinen, I., and Pierce, J. R.: Understanding global secondary organic aerosol amount and size-resolved condensational behavior, *Atmos. Chem. Phys.*, 13, 11519-11534, doi:10.5194/acp-13-11519-11534, 2013

Westervelt, D. M., Pierce, J. R., Riipinen, I., Trivitayanurak, W., Hamed, A., Kulmala, M., Laaksonen, A., Decesari, S., and Adams, P. J.: Formation and growth of nucleated particles into cloud condensation nuclei: model-measurement comparison, *Atmos. Chem. Phys.*, 13, 7645-7663, doi:10.5194/acp-13-7645-2013, 2013

Hennigan, C. J., **Westervelt, D.M.**, I. Riipinen, G. J. Engelhart, T. Lee, J. L. Collett Jr., S. N. Pandis, P. J. Adams, and A. L. Robinson (2012), New particle formation and growth in biomass burning plumes: An important source of cloud condensation nuclei, *Geophys. Res. Lett.*, 39, L09805, doi:10.1029/2012GL050930.

Westervelt, D. M., Moore, R. H., Nenes, A., and Adams, P. J.: Effect of primary organic sea spray emissions on cloud condensation nuclei concentrations, *Atmos. Chem. Phys.*, 12, 89-101, doi:10.5194/acp-12-89-2012,2012.

Pierce, J. R., Leaitch, W. R., Liggio, J., **Westervelt, D. M.**, Wainwright, C. D., Abbatt, J. P. D., Ahlm, L., Al-Basheer, W., Cziczo, D. J., Hayden, K. L., Lee, A. K. Y., Li, S.-M., Russell, L. M., Sjostedt, S. J., Strawbridge, K. B., Travis, M., Vlasenko, A., Wentzell, J. J. B., Wiebe, H. A., Wong, J. P. S., and Macdonald, A. M.: Nucleation and condensational growth to CCN sizes during a sustained pristine biogenic SOA event in a forested mountain valley, *Atmos. Chem. Phys.*, 12, 3147-3163, doi:10.5194/acp-12-3147-2012, 2012

Snow-Kropla, E. J., Pierce, J. R., **Westervelt, D. M.**, and Trivitayanurak, W.: Cosmic rays, aerosol formation and cloud-condensation nuclei: sensitivities to model uncertainties, *Atmos. Chem. Phys.*, 11, 4001-4013, doi:10.5194/acp-11-4001-2011, 2011

Book chapters

Donahue, N. M., Posner, L. N., **Westervelt, D. M.**, Li, Z., Shrivastava, M., Presto, A. A., Sullivan, R. C., Adams, P. J., Pandis, S. N., Robinson, A. L.: Where Did This Particle Come From? Sources of Particle

Number and Mass for Human Exposure Estimates. *Airborne Particulate Matter: Sources, Atmospheric Processes, and Health*. pp. 35–71., doi:10.1039/9781782626589-00035, 2016.

Selected Presentations

Invited

MAIA Science Team Meeting (virtual due to COVID19)	May 2020
Makerere University, Kampala, Uganda	Aug 2019
Air Pollution in Africa: Current research and future directions at Columbia University	
University of Birmingham / Population Council Air Pollution Workshop	Aug 2019
Air Pollution in Africa: Current research and future directions at Columbia University	
USAID Air Pollution Solutions Workshop, New York, NY	April 2019
Development of a low cost air pollution sensor network in sub-Saharan Africa	
Georgia Institute of Technology, Department of Earth and Atmospheric Science	Feb 2019
The Atmospheric Chemistry, Air Quality, and Climate Change Nexus: From the nano to the global scale”	
American Geophysical Union Fall Meeting 2018	Dec 2018
Washington, DC. “Connecting regional aerosol emissions reductions to local and remote precipitation responses”. Invited, GH11C: Short-Lived Pollutants in the Human–Climate System	
Columbia Mailman School of Public Health Climate and Health Department Seminar. “Mid-21st century ozone air quality in China under emissions scenarios and climate change”	Sep 2018
Nanjing Agricultural University, Department of Environmental Science	July 2018
“Air pollution and climate change research at Columbia”	
Rutgers University, Department of Environmental Sciences Seminar	May 2018
“The Air Quality – Climate Change Nexus: From the nano to the global scale”	
Ball State University, Department of Environmental Management	May 2018
“The Air Quality – Climate Change Nexus: From the nano to the global scale”	
New York University, Department of Environmental Engineering Department Seminar. “All about atmospheric aerosols: from air quality to climate change”. New York, NY	Mar 2017
American Geophysical Union Fall Meeting 2016	Dec 2016
San Francisco, CA. “The impact of sulfate removal on global and regional precipitation in three coupled climate models”. A11L: Tropospheric Chemistry-Climate Interactions	

Lamont-Doherty Earth Observatory Ocean and Climate Physics Seminar Jan 2016
Palisades, NY. “Taming the aerosol monster: a multimodel approach to elucidating the cloud and precipitation response to regional changes in aerosol emissions”

Contributed

American Geophysical Union (AGU) Fall 2017 Meeting Dec 2017
New Orleans, LA. Connecting regional aerosol emissions changes to local and remote precipitation responses. (Oral)

Joint CMIP6 meeting of AerChemMIP, RFMIP, and PDRMIP June 2018
University of Reading, Department of Meteorology, Reading, UK. Connecting regional aerosol emissions changes to local and remote precipitation responses

Teaching Experience

Adjunct Professor, Tandon School of Engineering, New York University Fall 2017-
Course: CE-GY 7523, Air Pollution. Graduate-level class. Overall evaluation: 4.6 / 5.0 present

Faculty, New Jersey Scholars Program, The Lawrenceville School Summer 2015
Taught summer course on “Climate Change and the Human Experience”

Encouraging Networks between Geoscience and Geoscience Education (ENGAGE) workshop Jan 2015
Held in Washington, DC. Sponsored and funded by National Science Foundation.

Eberly Center for Teaching Excellence Future Faculty Program 2012-2013
Completed teaching observations, course and syllabus development, attended seminars

Guest Lecturer, Introduction to Atmospheric Chemistry. Columbia University. Mar 2016,
Sulfate-nitrate-ammonium atmospheric thermodynamics. 2017, 2019, 2020

Guest Lecturer, Fundamentals of Atmospheric Aerosols (CU). April 2017, 2018
Taught 2 lecture (3 hours each) on aerosol microphysics

Guest Lecturer, Fundamentals of Atmospheric Aerosols (CMU) 2013
Taught 3 lectures on single particle dynamics, aerosol size distributions, and aerosol and cloud optical properties

Teaching and Lab Assistant, Various Classes 2009-2013
Assisted lab sessions, taught guest lectures, held weekly office hours, administered exams, grading

Students advised

Oreoluwa Solanke Summer 2020
LDEO Summer intern

Sarah Hanock LDEO Summer Intern	Summer 2020
Celeste McFarlane Undergraduate researcher (ChemE)	Spring 2020
William Tsui PhD defense committee	Spring 2020
Alison Fankhauser PhD defense committee	Fall 2020
Chang Wang MS Environmental Engineering (Dec 2019) Poster presented at AGU 2019	Fall 2019
Anant Majumdar Earth Institute Intern (BA Computer Science 2020).	Spring 2019
Clara T. Ma LDEO summer intern. (BS Geology and Geophysics Yale 2020) Oral presentation given by Clara at AGU Fall Meeting 2017	Summer 2017
Karen Xia Earth Institute Intern (BS Computer Science and Statistics 2018) Poster presented at AAAR 35 th annual fall meeting.	2015-2017
Karen Yu Undergraduate intern. (BS CMU Environmental Engineering 2012, PhD Harvard Atmospheric Science 2019)	2010-2012

Professional Development

Meeting organizer

Columbia University Air Pollution Roundtable. Nairobi, Kenya. August 26, 2019. Columbia Global Centers

Meeting co-organizer

“Air Pollution Extremes”. Columbia University Initiative on Extreme Weather. November 1-2, 2018

Session Convener and Chair

“Interactions of Air Quality and Meteorology on Local to Synoptic Scales”. AGU Fall Meeting 2017. New Orleans, LA and AGU Fall Meeting 2018, Washington, DC, and 2019 at San Francisco, CA.

Session Chair

“Carbonaceous Aerosols in the Atmosphere”. American Association for Aerosol Research 34th annual meeting. Minneapolis, MN. Oct. 2015

Peer reviewer

Atmospheric Chemistry and Physics, Geoscientific Model Development, Atmospheric Environment, Journal of the Advances of Modeling Earth Systems, Aerosol Science and Technology, Environmental Science and Technology, Journal of Geophysical Research, Geophysical Research Letter, Nature Climate Change

President

American Association of Aerosol Research Carnegie Mellon Chapter (2012)

Secured funding and started guest speaker series, supervised creation of an air quality community awareness blog

Poster Judge, student poster competition

AGU 2014, 2016, 2017, 2018, 2019, AAAR 2014, 2015, 2016

Outreach Activities

Lamont-Doherty Earth Observatory Open House Public Speaker. October 2019

New York State Science and Engineering Fair Judge, March 2017, New York, NY

Lamont-Doherty Earth Observatory Open House. Oct 2016, 2018. Palisades, NY. Designed and conducted a “clouds in a jar” experiment at the Ocean and Climate Physics booth.

Invited guest speaker, St. Thomas Aquinas College Earth Day Fair, 2016

Early career researcher panel member, 2015-2016, Various occasions at LDEO

Judge, 2012 Pittsburgh Regional Middle and High School Science Fair

Co-founder and contributing author, Air Quality awareness blog, www.particulatematters.net

Honors and awards

Fellow, Columbia Center for Climate and Life (2019-2022)

Science, Technology, and Environmental Policy Research Fellowship (2013-2014)

Dean’s Fellowship, Carnegie Mellon University (2009-2010)

American Association for Aerosol Research Conference Travel Grant (2012)

Carnegie Mellon Graduate Student Association Travel Grant (2010, 2011, 2012)