

Gaige Hunter Kerr

RESEARCH SCIENTIST · AIR QUALITY AND ATMOSPHERIC SCIENCES

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Experience

George Washington University, Department of Environmental and Occupational Health

RESEARCH SCIENTIST

POSTDOCTORAL SCIENTIST

Advisor: Susan Anenberg

Washington, DC

July 2021–Present

July 2020–June 2021

NASA Goddard Space Flight Center

STUDENT RESEARCH COLLABORATOR

Greenbelt, MD

June 2017–May 2020

Education

Johns Hopkins University, Department of Earth & Planetary Sciences

Ph.D., M.A.; Earth & Planetary Sciences

Advisor: Darryn Waugh

Baltimore, MD

2015–2020

Cornell University, Department of Earth and Atmospheric Sciences

B.Sc. (*cum laude* with distinction); Atmospheric Sciences

Advisors: Art DeGaetano, Gang Chen

Ithaca, NY

2011–2015

Publications

Pending

Lee, D.-Y., Wilson, A. J., **Kerr, G. H.**, Anenberg, S. C., & Thomas, V. (in prep.) Environmental Profiling of The Haves and The Have Nots for Electric Vehicles and Charging Infrastructure in the United States.

Kerr, G. H., Badr, H. S., Barbieri, A. F., Colston, J. M., Gardner, L. M., Kosek, M. N., & Zaitchik, B. F. (submitted) Evolving drivers of Brazilian SARS-CoV-2 transmission: A spatiotemporally disaggregated time series analysis of meteorology, policy, and human mobility. [\[link\]](#)

Kerr, G. H., Martin, R. V., van Donkelaar, A., Brauer, M., Bukart, K., Wozniak, S., Goldberg, D. L., & Anenberg, S. C. (under review). Increasing disparities in air pollution health burdens in the United States. [\[link\]](#)

Colston, J. M., Hinson, P., Nguyen, N.-L. H., Chen, Y. T., Badr, H. S., **Kerr, G. H.**, Gardner, L. M., Martin, D. N., Quispe, A. M., Schiaffino, F., Kosek, M. N., & Zaitchik, B. F. (under review). Effects of hydrometeorological and other factors on SARS-CoV-2 reproduction number in three contiguous countries of Tropical Andean South America: A spatiotemporally disaggregated time series analysis. [\[link\]](#)

Badr, H. S., Zaitchik, B. F., **Kerr, G. H.**, Nguyen, N.-L. H., Chen, Y.-T., Hinson, P., Colston, J. M., Kosek, M. N., Dong, E., Hongru, D., Marshall, M., Kristen, N., Mohegh, A., Goldberg, D. L., Anenberg, S. C., & Gardner, L. M. (under review). Unified real-time environmental-epidemiological data for multiscale modeling of the COVID-19 pandemic. [\[link\]](#)

Refereed

[14] Zhang, X., Waugh, D. W., **Kerr, G. H.**, & Miller, S. M. (2022). Surface ozone-temperature relationship: The meridional gradient ratio approximation. *Geophys. Res. Lett.*, 49(13), e2022GL098680. [\[link\]](#)

[13] **Kerr, G. H.**, Goldberg, D. L., Knowland, K. E., Keller, C. A., Oladini, D., Kheirbek, I., Mahoney, L., Lu, Z. & Anenberg, S. C. (2022). Diesel passenger vehicle shares influenced COVID-19 changes in urban nitrogen dioxide pollution. *Environ. Res. Lett.*, 17(7), 074010. [\[link\]](#)

[12] Anenberg, S. C., Mohegh, A., Goldberg, D. L., **Kerr, G. H.**, Brauer, M., Burkart, K., Hystad, P., Larkin, A., Wozniak, S., & Lamsal, L. (2022). Long-term trends in urban NO₂ concentrations and associated pediatric asthma incidence: Estimates from global datasets. *Lancet Planet. Health*, 6(1), E49–E58. [\[link\]](#)

- [11] Goldberg, D. L., Anenberg, S. C., **Kerr, G. H.**, Lu, Z. & Streets, D. G. (2021). TROPOMI: A revolutionary new satellite instrument measuring NO₂ air pollution. *EM (Pittsburgh Pa)*. [\[link\]](#)
- [10] Anenberg, S. C., **Kerr, G. H.**, & Goldberg, D. L. (2021). Leveraging satellite data to address air pollution inequities. *EM (Pittsburgh Pa)*. [\[link\]](#)
- [9] **Kerr, G. H.**, Goldberg, D. L. & Anenberg, S. C. (2021). COVID-19 pandemic reveals persistent disparities in nitrogen dioxide pollution. *Proc. Natl. Acad. Sci. U.S.A.*, 118(30), e2022409118. [\[link\]](#)
- [8] Gorris, M. E., Anenberg, S. C., Goldberg, D. L., **Kerr, G. H.**, Stowell, J. D., Tong, D., & Zaitchik, B. F. (2021). Shaping the future of science: COVID-19 highlighting the importance of GeoHealth. *GeoHealth*, 5(5), e2021GH000412. [\[link\]](#)
- [7] Goldberg, D. L., Anenberg, S. C., **Kerr, G. H.**, Mohegh, A., Lu, Z., & Streets, D. G. (2021). TROPOMI NO₂ in the United States: A detailed look at the annual averages, weekly cycles, effects of temperature, and correlation with surface NO₂ concentrations. *Earths Future*, 9(4), e2020EF001665. [\[link\]](#)
- [6] **Kerr, G. H.**, Badr, H. S., Gardner, L. M., Perez-Saez, J., & Zaitchik, B. F. (2021). Associations between meteorology and COVID-19 in early studies: Inconsistencies, uncertainties, and recommendations. *OneHealth*, 12, 100225. [\[link\]](#)
- [5] **Kerr, G. H.**, Waugh, D. W., & Miller, S. M. (2021). Jet stream-surface tracer relationships: Mechanism and sensitivity to source region. *Geophys. Res. Lett.*, 48(1), e2020GL090714. [\[link\]](#)
- [4] **Kerr, G. H.**, Waugh, D. W., Steenrod, S. D., Strode, S. A., & Strahan, S. E. (2020). Surface ozone-meteorology relationships: Spatial variations and the role of the jet stream. *J. Geophys. Res. Atmos.*, 125(21), e2020JD032735. [\[link\]](#)
- [3] **Kerr, G. H.**, Waugh, D. W., Strode, S. A., Steenrod, S. D., Oman, L. D., & Strahan, S. E. (2019). Disentangling the drivers of the summertime ozone-temperature relationship over the United States. *J. Geophys. Res. Atmos.*, 124(19), 10503–10524. [\[link\]](#)
- [2] **Kerr, G. H.**, & Waugh, D. W. (2018). Connections between summer air pollution and stagnation. *Environ. Res. Lett.*, 13(8), 084001. [\[link\]](#)
- [1] **Kerr, G. H.**, DeGaetano, A. T., Stoof, C. R., & Ward, D. (2018). Climate change effects on wildland fire risk in the Northeastern and Great Lakes states predicted by a downscaled multi-model ensemble. *Theor. Appl. Climatol.*, 131, 625–639. [\[link\]](#)

Datasets

- [1] Badr, H. S., Zaitchik, B. F., **Kerr, G. H.**, Colston, J. M., Hinson, P., Chen, Y., Nguyen, N. H., Kosek, M., Du, H., Dong, E., & Gardner, L. M. (2020). Unified COVID-19 Dataset. GitHub. [\[link\]](#)

Non-Refereed

- [5] **Kerr, G. H.** (2020). Elucidating the relationships between surface-level ozone and meteorology, (PhD thesis). Retrieved from JScholarship. (jhir.library.jhu.edu/handle/1774.2/63465). Baltimore, MD: Johns Hopkins University.
- [4] Krocak, M. J., **Kerr, G. H.**, & Flournoy, M. D. (2019). Diversity, equity, and inclusion in the atmospheric sciences. An interview with Kevin Petty. *Bull. Amer. Meteor. Soc.*, 100(6), 1126.
- [3] Flournoy, M. D., Krocak, M. J., & **Kerr, G. H.** (2018). An introvert's guide to networking. *Bull. Amer. Meteor. Soc.*, 99(11), 2379.
- [2] **Kerr, G. H.**, Krocak, M. J., Flournoy, M. D., & Knox, J. A. (2018). Weathering together: Building a climate of diverse community perspectives. *Bull. Amer. Meteor. Soc.*, 99(10), 2150.
- [1] **Kerr, G. H.** (2015) Climate change effects on fire risk in the U. S. Northeast, (undergraduate honors thesis). Ithaca, NY: Cornell University.

Research Grants

Current

Co-1 (*Anenberg is PI*): “Value of GeoXO atmospheric composition data for estimating air pollution-related health impacts,” NOAA (1 August 2021–31 July 2024; \$599,416).

Principal Coordinator (*Anenberg and Qian Xiao are PIs*): “Satellite data for environmental justice (SD4EJ),” NASA HAQAST Tiger Team (1 July 2021–30 December 2022; \$140,000).

Competitive grants not selected for funding

Co-1 (*Sacoby Wilson is PI*): “Addressing environmental racism through GIS mapping and community science,” NIH (1 April 2022–31 March 2027; \$3,872,900).

Co-1 (*Susan Anenberg is PI*): “From space to the street: Using satellite remote sensing to address environmental injustice from transportation-related air pollution,” NASA HAQ (1 January 2022–31 December 2024; \$1,049,809).

Presentations

Selected invited talks

[12] **Kerr, G. H.** (2022). *Disparities in air pollution and attributable health burdens in the United States: Who, why, and what to do?* Center for Public Health and Environmental Assessment/Public Health and Environmental Systems Division Seminar Series, Environmental Protection Agency (virtual).

[11] **Kerr, G. H.** (2022). *From space to the streets: Using satellite data to track neighborhood-scale air inequality.* Earth Science Applications Week 2022, NASA (virtual).

[10] **Kerr, G. H.** (2022). *Trends and environmental justice implications of air pollution in the United States.* International Visitor Leadership Program, U.S. Department of State Bureau of Educational and Cultural Affairs, Washington, DC.

[9] Southerland, V. A., & **Kerr, G. H.** (2022). *Health and justice implications of urban air pollution on regional to global scales.* Air Pollution Inequity Series, Environmental Defense Fund (virtual).

[8] Goldberg, D. L., & **Kerr, G. H.** (2022). *Using NO₂ satellite data for urban environmental justice applications and lessons learned during the COVID-19 lockdowns.* Bureau of Air Quality Analysis and Research Seminar Series, NYS Department of Environmental Conservation (NYSDEC) Division of Air Resources (virtual).

[7] **Kerr, G. H.**, Goldberg, D. L., Kheirbek, I., Mahoney, L., Anenberg, S. C. & Oladini, D. (2021). *The COVID-19 natural experiment: Insights into trends, drivers, and impacts of nitrogen dioxide pollution.* Fall Meeting of the American Geophysical Union, New Orleans, LA.

[6] **Kerr, G. H.** (2021). *Lessons learned from changes in nitrogen dioxide pollution during COVID-19.* CSL Seminar Series, NOAA Chemical Sciences Laboratory (virtual).

[5] **Kerr, G. H.** (2021). *COVID-19 pandemic reveals persistent disparities in NO₂ pollution.* Online Summer Workshop in Environment, Energy, and Transportation (virtual).

[4] **Kerr, G. H.** (2021). *Transportation impacts on NO₂ pollution and racioethnic disparities during COVID-19.* Environmental Sciences Graduate Program, University of California, Riverside (virtual).

[3] **Kerr, G. H.** (2021). *Elucidating the relationship between O₃ and meteorology & COVID-19 pandemic reveals persistent NO₂ disparities.* Atmospheric Chemistry Modeling Group, Harvard University (virtual).

[2] **Kerr, G. H.** (2020). *Elucidating the relationship between surface ozone and meteorology.* University of Maryland, College Park, MD.

[1] **Kerr, G. H.** (2019). *What controls the ozone-temperature relationship? Results from the GMI CTM over the United States.* CCM Meeting, NASA Goddard Space Flight Center, Greenbelt, MD.

Conference talks

[19] **Kerr, G. H.**, Goldberg, D. L., & Anenberg, S. C. (2022). *Nitrogen dioxide-attributable pediatric asthma in the United States: Burden, trends, and environmental justice concerns.* 24rd Conference on Atmospheric Chemistry, American Meteorological Society (virtual).

[18] **Kerr, G. H.**, Goldberg, D. L., Harris, M., Roy, A., & Anenberg, S. C. (2021). *Nitrogen dioxide-attributable pediatric asthma in the United States: Burden, trends, and environmental justice concerns.* Fall Meeting of the American Geophysical Union, New Orleans, LA.

[17] Goldberg, D. L., Anenberg, S. C., **Kerr, G. H.**, McDuffie, E. E., Smith, S., Lu, Z., & Streets, D. G. (2021). *Reconciling differences between satellite-inferred NO_x emissions and inventories in global cities.* Fall Meeting of the American Geophysical Union, New Orleans, LA.

[16] Anenberg, S., Goldberg, D., & **Kerr, G. H.** (2021). *Inconsistent NO₂ during COVID-19 lockdowns: Lessons for protecting near-term public health and designing longer-term environmental policies.* MARAMA Mobile Sources Workshop (virtual).

- [15] Anenberg, S., Goldberg, D., & **Kerr, G. H.** (2021). *Inconsistent NO₂ during COVID-19 lockdowns: Lessons for protecting near-term public health and designing longer-term environmental policies*. MARAMA Mobile Sources Workshop (virtual).
- [14] Goldberg, D. L., Anenberg, S., Griffin, D., McLinden, C. A., **Kerr, G. H.**, Lu, Z., Streets, D. G. (2020) *Using TROPOMI and re-analysis meteorology to disentangle the impact of the COVID-19 lockdowns on urban NO₂ from natural variability*. Fall Meeting of the American Geophysical Union (virtual).
- [13] **Kerr, G. H.**, Goldberg, D. L. & Anenberg, S. C. (2021). *Impact of coronavirus lockdowns on NO₂: Successes and challenges for environmental inequality in the United States*. 23rd Conference on Atmospheric Chemistry/12th Conference on Environment and Health, American Meteorological Society (virtual).
- [12] Anenberg, S., Goldberg, D. L., **Kerr, G. H.**, Lu, Z., Griffin, D., McLinden, C. A., Duncan, B. N., Miller, J., Minjares, R. J., & Dreessen, J. (2020). *Inconsistent NO₂ drops during COVID-19 lockdowns: Lessons for protecting near-term public health and designing longer-term environmental policies*. Fall Meeting of the American Geophysical Union (virtual).
- [11] **Kerr, G. H.**, Goldberg, D. L. & Anenberg, S. C. (2020). *Environmental injustices associated with coronavirus-related changes in NO₂ pollution*. Fall Meeting of the American Geophysical Union (virtual).
- [10] **Kerr, G. H.**, Goldberg, D. L. & Anenberg, S. C. (2020). *COVID-19 lockdowns reveal pronounced disparities in nitrogen dioxide pollution levels*. Urban Air Quality Breakout, Keck Institute for Space Studies, Caltech (virtual).
- [9] Goldberg, D., Anenberg S., **Kerr, G.**, Lu, Z., McLinden, C., & Griffin, D. (2020). *Disentangling the impact of COVID-19 lockdowns on urban NO₂ from natural variability*. Community Modeling and Analysis System Conference (virtual).
- [8] **Kerr, G. H.**, Waugh, D. W. (2020). *Connections between the surface-level ozone-temperature relationship and the eddy-driven jet stream*. 22nd Conference on Atmospheric Chemistry, American Meteorological Society, Boston, MA.
- [7] **Kerr, G. H.**, Waugh, D. W., Steenrod, S. D., & Strode, S. A. (2019). *Sensitivity of surface-level ozone to temperature-related processes*. 21st Conference on Atmospheric Chemistry, American Meteorological Society, Phoenix, AZ.
- [6] **Kerr, G. H.**, & Waugh, D. W. (2018). *Impacts of emission variability on CTM pollutant representation*. 20th Joint Conference on the Applications of Air Pollution Meteorology with the A&WMA, American Meteorological Society, Austin, TX.
- [5] **Kerr, G. H.**, & Waugh, D. W. (2017). *Connections between air pollution and stagnation*. Fall Meeting of the American Geophysical Union, New Orleans, LA.
- [4] **Kerr, G. H.**, & Waugh, D. W. (2017). *Modeling of regional air pollution events*. Meteorology And Climate–Modeling for Air Quality Conference, Davis, CA.
- [3] **Kerr, G. H.**, & Waugh, D. W. (2017). *Air pollution in the Northeastern United States: Elucidating drivers of PM_{2.5} and O₃ events*. 19th Conference on Atmospheric Chemistry, American Meteorological Society, Seattle, WA.
- [2] **Kerr, G. H.**, & DeGaetano, A. T. (2016). *Climate change effects on wildland fire risk in the Northeastern United States and Great Lakes region*. 28th Conference on Climate Variability and Change, American Meteorological Society, New Orleans, LA.
- [1] **Kerr, G. H.**, DeGaetano, A. T., & Flannigan, M. D. (2015). *Climate change effects on fire risk in the Northeast U.S.* Northeastern Storms Conference, Saratoga Springs, NY.

Conference posters

- [6] Anenberg, S. C., Brauer, M., Burkart, K., Goldberg, D., Hystad, P., **Kerr, G.**, Larkin, A. & Wozniak, S. (2022). *Integrating satellites, ground monitoring, and modeling to estimate long-term NO₂ exposures and associated pediatric asthma impacts*. Health Effects Institute Annual Conference, Washington, DC.
- [5] **Kerr, G. H.**, Badr, H. S., Perez-Saez, J., & Zaitchik, B. F. (2020). *Bridging the worlds of modeling the spread of COVID-19 and meteorology*. Climatological, Meteorological and Environmental factors in the COVID-19 pandemic of the World Meteorological Organization (virtual meeting).
- [4] **Kerr, G. H.**, Badr, H. S., Gardner, L. M., Perez-Saez, J., & Zaitchik, B. F. (2020). *Consequences of modeling assumptions and scope of analysis on connections between meteorology and COVID-19*. Japan Geoscience Union-American Geophysical Union Joint Meeting (virtual meeting).
- [3] **Kerr, G. H.**, & Waugh, D. W. (2019). *What causes the observed surface ozone-temperature relationship? Effect of the eddy-driven jet on surface-level transport*. Meteorology And Climate–Modeling for Air Quality Conference, Davis, CA.

[2] **Kerr, G. H.**, & Waugh, D. W. (2018). *Temperature-dependent drivers of summer surface-level ozone: Insights from a chemical transport model within the Eastern United States*. iCACGP-IGAC Science Conference, Takamatsu, Kagawa, Japan.

[1] **Kerr, G.**, Chaubey, J. P., O'Neill, N. T., Hayes, P., & Atkinson, D. E. (2014). *Identification of absorbing organic (brown carbon) aerosols through sun photometry: Results from AEROCAN/AERONET stations in high Arctic and urban locations*. Fall Meeting of the American Geophysical Union, San Francisco, CA.

Fellowships, Honors & Awards

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| 2021 | Selected to participate in ACCESS XVI , Brookhaven National Laboratory |
| 2021 | Jane Warren Trainee Conference Award , Health Effects Institute |
| 2020–2021 | Air Quality Fellow , Greening Diplomacy Initiative, U.S. Department of State |
| 2020 | Postdoc Appreciation Day Research Symposium Award , George Washington University |
| 2020 | ASP Postdoctoral Fellowship , National Center for Atmospheric Research (declined) |
| 2020 | Earth Institute Postdoctoral Fellowship , Columbia University (declined) |
| 2018 | Best Student Presentation , Department of Earth & Planetary Sciences, Johns Hopkins University |
| 2018 | J. Brien Key Travel Award , Johns Hopkins University |
| 2018 | Jay Fein Scholarship , American Meteorological Society |
| 2017 | Travel Award , UC Davis Air Quality Research Center/California Air Resources Board |
| 2017 | Committee on Atmospheric Chemistry Travel Award , American Meteorological Society |
| 2016–2018 | Water, Climate, and Health Integrative Graduate Education and Research Traineeship (IGERT) Program , NSF |

Teaching & Outreach

Invited guest lecturer:

Environmental and Occupational Epidemiology (PUBH 6121), George Washington University, Fall 2021
Introduction to Air Quality (ENVR ST/ATM OCN 355), University of Wisconsin-Madison, Fall 2021
Global Climate Change and Air Pollution (PUBH 6140), George Washington University, Summers 2021 & 2022

Invited panelist:

Environmental Justice Series, Georgetown University School of Medicine, Summer 2021
Voices of Climate Justice, SatSummit 2022, September 2022

Instructor:

Python for Beginners (BIOF 020), National Institutes of Health Foundation for Advanced Education in the Sciences, Summer 2021

Teaching assistant:

Oceans & Atmospheres (AS.270.224), Johns Hopkins University, 11 students, Spring 2019
Introduction to Global Environmental Change (AS.270.103), Johns Hopkins University, 45 students, Fall 2018
Atmospheric Thermodynamics and Hydrostatics (EAS 3410), Cornell University, Fall 2014

Grader:

Climate Change and Global Warming (EAS 2680), Cornell University, Spring 2015

Johns Hopkins Teaching Academy: Completed a three-phase professional development program to learn an overview of pedagogy, acquire teaching and assessment skills, and serve as an apprentice with faculty mentors (August 2018–April 2019).

Engineering Innovation: Developed and taught an intensive, two-week curriculum reviewing Algebra, Physics, Trigonometry, and Computer Science for ~20 Baltimore City high school students (Summers 2016–2019).

Leadership

Ad-hoc reviewer: *Journal of Geophysical Research: Atmospheres*, *Environmental Research Letters*, *Environmental Science & Technology Letters*, *Journal of Climate*, *Atmospheric Chemistry and Physics*, *Geophysical Research Letters*, *Elementa: Science of the Anthropocene*, *OneHealth*, *Atmospheric Environment*, *Weather and Climate Dynamics*, *Remote Sensing of Environment*, *International Journal of Environmental Research and Public Health*

Member: American Meteorological Society (AMS) Overall Planning Committee for 2023 Annual Meeting (2021–present)

Member: AMS Annual Meeting Oversight Committee (2020–present)

Member: AMS Board on Representation, Accessibility, Inclusion, and Diversity (chair of Coriolis LGBTQ+ committee and responsible for planning webinars and social/networking activities for AMS LGBTQ+ community and co-chair of ad-hoc environmental justice committee) (2017–present)

Member: AMS Charles Anderson Award Committee (2019), AMS Louis J. Battan Author's Award Committee (2020, 2021)

Student presentation judge: AMS Student Conference poster session (2020, 2021), American Geophysical Union (2020)

Co-chair: AMS Student Conference (responsible for organizing an annual two-day conference for 800+ students and overseeing a budget of ~\$120,000) (2018–2020)

Student member: AMS Task Force on Professional Conduct (2019–2020)

Student member: AMS Committee on Meteorological Aspects of Air Pollution (2016–2019)

Public Spotlights & Highlights

Politico “Activists fear EPA’s truck pollution rule will miss the mark” [\[link\]](#)

Popular Science “Low-carbon energy minimizes racial disparities in neighborhoods with air pollution” [\[link\]](#)

Chemical & Engineering News “Satellite data reveal that diesel trucking drives US air pollution inequality” [\[link\]](#)

Stat “The pandemic made clear who doesn’t get to breathe clean air. Now what?” [\[link\]](#)

ABC News “Air pollution remained higher in minority communities during the pandemic, revealing persistent health disparities” [\[link\]](#)

NASA “Q&A: Scientists analyze how the pandemic affected air quality” [\[link\]](#)

Chemical & Engineering News “Air pollution disparities persisted during COVID-19 lockdowns” [\[link\]](#)

PNAS Science Sessions Podcast “Racial disparities in air pollution” [\[link\]](#)

National Geographic “Does everyone need to wear a mask outside? Experts weigh in” [\[link\]](#)

Scripps Media, Inc. “What environmental changes from COVID-19 will stick around after pandemic?” [\[link\]](#)

The Weather Channel [\[link\]](#)

Baltimore Daily Sun “Crude oil shipments threaten city neighborhoods” [\[link\]](#)

Interests

traveling, hiking, and backpacking • cooking • genealogy • houseplants • classical piano and pipe organ