M. OMAR NAWAZ, PhD

George Washington University, Milken Institute School of Public Health, Department of Environmental and Occupational Health, Air, Climate, and Health Lab

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RESEARCH EXPERIENCE

Postdoctoral Research Associate with Dr. Susan C. Anenberg
National Resources Defense Council Health Science Policy Fellow
George Washington University, Milken Institute School of Public Health, Department of Environmental and Occupational Health, Washington, DC
2023 – Current
- Led team of researchers in partnership with the National Resources Defense Council to integrate health and equity in climate policy modelling as a Health Science Policy Fellow
- Led NASA proposal ($1,016,525; under review) to investigate how climate action could affect compounding air quality and heat hazards, exposures, and vulnerabilities
- Contributed to multiple selected and pending federal grant awards
- Organized consulting projects ($17,000 total) with the International Council on Clean Transportation to investigate how transportation emission standards affect air quality
- Integrated satellite remote sensing observations of atmospheric composition with statistical and deterministic modelling for air quality, health, and policy analyses
- Invited speaker at United Nations Environmental Programme workshop in Bogotá, Colombia on clean air strategies to improve public health and advance climate goals
- Led and contributed to peer-reviewed papers and presented at conferences / workshops

Ph.D. Research Assistant with Dr. Daven K. Henze
University of Colorado Boulder, Department of Mechanical Engineering, Boulder, CO
2018 – 2023
- Developed novel method to integrate satellite remote sensing with adjoint modelling to identify air pollution sources and climate policy impacts
    - This approach was used in reduced form tools: NASA AQACF (NPO-52578-1), the ICCT FATE tool, and the SEI LEAP-IBC tool and in studies by other researchers: Choi et al 2024; Gu et al. 2023a,b
- First author on multiple peer-reviewed manuscripts including two with media coverage:
    - Connected Amazon deforestation to air quality and health impacts in Brazil
    - Explored the health benefits of net-zero goals in G20 countries
- Organized department seminar series on air quality research

M.S. Research Assistant with Dr. J. Jason West
University of North Carolina at Chapel Hill, Gillings School of Global Public Health, Department of Environmental Engineering, Chapel Hill, NC
2016 – 2018
- Developed GIS approach to integrate US CDC county-level disease rates, with remote sensing derived pollution, and population data to estimate air pollution health impacts in the United States (won 1st place student poster award at Climate Change symposium)

GRANTS

Current
2024   Application of satellite observations in estimating NO_2 concentrations, mortality burdens, and inequities. NASA ROSES FINESST F.5 (**Collaborator**) ($150,000)

2024   Study of Global Maritime Shipping-Attributable Health Impacts by the International Council on Clean Transportation (ICCT) (**Consultant**) ($5,000)

2023   Study of Global Transportation-Attributable Health Impacts by the International Council on Clean Transportation (ICCT) (**Consultant**) ($12,000)

Pending
2024   HEAD-IN: Assessing disaster risk and resilience action benefits associated with compound heat and air quality hazards, exposures, and vulnerabilities. NASA ROSES A42. (**Primary Investigator**) ($1,016,525)

2024   Societal benefits of TEMPO NO2: Applications for air quality management and environmental justice (**Other Personnel**) ($550,000)

Competitive Grants Not Selected for Funding
2020   Development of a source attribution and data assimilation framework for MAIA primary and secondary target areas in North America and South America. NASA ROSES FINESST F.5 (**Future Investigator**) ($150,000)

HONORS AND FELLOWSHIPS

2024   GeoCAFE Scholar

2023   National Resources Defense Council Health Science Policy Fellowship

2018   Outstanding Mechanical Engineering Research Potential Fellowship

2018   1st place student poster Award, UNC 5th Climate Change Symposium

EDUCATION

Ph.D. in Mechanical Engineering, Air Quality Focus
2023   Department of Mechanical Engineering, University of Colorado Boulder
Dissertation: *An adjoint sensitivity framework for public health: the sources of air pollution and their current and future impacts at both the urban and national scale.*
Committee: Dr. Daven K. Henze (Advisor), Dr. Susan C. Anenberg, Dr. Michael P. Hannigan, Dr. Colleen E. Reid, Dr. Christine Wiedinmyer

M.S. in Environmental Engineering
2018   Gillings School of Global Public Health, University of North Carolina at Chapel Hill
Dissertation: *Benefits of reduced premature mortality from decreases in $PM_{2.5}$ and ozone in the United States from 1999 to 2015.*
Committee: Dr. J. Jason West (Advisor), Dr. Marc Serre, Dr. William Vizuete

B.S. in Physics, B.S. in Applied Mathematics, Minor in Astronomy
2017   Department of Physics and Astronomy, University of North Carolina at Chapel Hill
2017   Department of Mathematics, University of North Carolina at Chapel Hill

POSTGRADUATE TEACHING

Professorial Lecturer
Course: Global Climate Change and Air Pollution (PuBH 6140)
Department of Environmental and Occupational Health
Milken Institute School of Public Health, George Washington University
Fall 2024
- Designed and delivered lectures for a group of graduate students on the linkages between climate, air quality, and health
- Graded exams, papers, presentations, and other assignments; proctored exams
- Led class discussions on climate and air pollution topics and current events

UNDERGRADUATE TEACHING

Lead Teaching Assistant
Course: Computational Methods (MCEN 3030)
Department of Mechanical Engineering
University of Colorado Boulder
Spring 2019
- Led tutorials and office hours for a class of around 100 undergraduate students
- Graded exams, homework, and computational projects; proctored exams.
- Managed a group of graders and teaching assistants

Teaching Assistant
Course: Computational Methods (MCEN 3030)
Department of Mechanical Engineering
University of Colorado Boulder
Fall 2018
- Led tutorials and office hours for a class of around 100 undergraduate students
- Graded exams, homework, and computational projects; proctored exams.

MENTORSHIP

Research Mentees
Olivia Paquette (B.S. Student, Current)
- Supported undergraduate researcher to develop contributions to pending federal grant
Erin Campbell (M.P.H Student, Current)
Katie O'Donnell (M.P.H, Current)
- Supported M.P.H researchers to advise the National Resources Defense Council on integrating health and equity in climate policy modeling as Health Science Policy Fellow
Soo-Yeon Kim (Ph.D., 2024)
- Advised PhD researcher on proposal selected for funding in NASA FINESST program
Mohammed Alwakeel (B.S., 2021, next a mechanical engineer)
- Recipient of the Outstanding Undergraduate for International Engagement award

ACADEMIC SERVICE

Ad-Hoc Peer-Review for Journals (22)

Atmospheric Chemistry and Physics: 2024 (1)
Discover Cities: 2024 (1)
Elementa: Science of the Anthropocene: 2021 (1)
Environmental Research Letters: 2024 (1)
Environmental Science & Technology: 2023 (1), 2022 (1), 2019 (1)
Environmental Science & Technology Air: 2024 (1)
GeoHealth: 2024 (2), 2023 (1)
Health Data Science: 2024 (1)
International Geoscience and Remote Sensing Symposium: 2024 (6)
Nature Food: 2024 (1)
Lancet Planetary Health: 2021 (1)
Journal of the Air and Waste Management Association: 2019 (1)
Scientific Reports: 2024 (1)

Department Service, Conferences, and Seminars

- Seminar series coordinator for the "Collaborative for Air Quality Research" (CAQR) at the University of Colorado Boulder for the Department of Mechanical Engineering
- Student lead and mentor for Thermodynamics and Fluid Mechanics preliminary exam preparation
- Volunteer presenter for "Mechanical Engineering as a Profession" (MCEN 2000) research round tables
- Student presenter and volunteer for the "Graduate Engineering Annual Research & Recruiting Symposium" (GEARRS), University of Colorado Boulder
- Student coordinator for the Community Modeling and Analysis System (CMAS) conference, Chapel Hill, NC (Funded)

PROFESSIONAL ASSOCIATIONS

2024- GeoCAFE Scholar
2024- Global Burden of Disease Study Collaborator
2023- American Meteorological Society
2023- European Geophysical Union
2018- American Geophysical Union

MEDIA COVERAGE

2023 [The Global Health Benefits of Going Net Zero](#)
2020 [Queimadas na Amazônia aumentam internações](#)

PUBLICATIONS (21)

Refereed Journal Articles (16)

2024   Goldberg, D.G., de Foy, B., **Nawaz, M.O**, Johnson, J., Yarwood, G., Judd, L., Identifying Sources of Urban NO_x Emissions in Houston, Texas using Remote Sensing Aircraft Measurements and Source Apportionment Regression Models. *ACS ES&T Air*. https://doi.org/10.1021/acsestair.4c00097

2024   Dyer, G. M. C., Khomenko, S., Adlakha, D., Anenberg, S. C., Angelova, J., Behnisch, M., Boeing, G., Chen, X., Cirach, M., de Hoogh, K., Diez-Roux, A. V., Esperon-Rodriguez, M., Flueckiger, B., Gasparrini, A., Iungman, T., Khreis, H., Kondo, M., Masselot, P., McDonald, R., … **Nawaz, M. O.**, … Nieuwenhuijsen, M. (2024). Commentary: A road map for future data-driven urban planning and environmental health research. *Cities* **155**, 105340 (2024). https://doi.org/10.1016/j.cities.2024.105340

2024   Choi, J., Henze, D. K., **Nawaz, M. O.**, & Malley, C. S. (2024). Source Attribution of Health Burdens From Ambient PM2.5, O3, and NO2 Exposure for Assessment of South Korean National Emission Control Scenarios by 2050. *GeoHealth* (Vol. 8, Issue 8). American Geophysical Union (AGU). https://doi.org/10.1029/2024gh001042

2024   Georgia M.C. Dyer, Sasha Khomenko, Deepti Adlakha, Susan Anenberg, Martin Behnisch, Geoff Boeing, Manuel Esperon-Rodriguez, Antonio Gasparrini, Haneen Khreis, Michelle C. Kondo, Pierre Masselot, Robert I. McDonald, Federica Montana, Rich Mitchell, Natalie Mueller, **Nawaz, M.O.**, Enrico Pisoni, Rafael Prieto-Curiel, Nazanin Rezaei, Hannes Taubenböck, Cathryn Tonne, Daniel Velázquez-Cortés, Mark Nieuwenhuijsen. Exploring the nexus of urban form, transport, environment and health in large-scale urban studies: A state-of-the-art scoping review, *Environmental Research*, Volume 257, 2024, https://doi.org/10.1016/j.envres.2024.119324.

2024   **Nawaz, M. O.,** Johnson, J., Yarwood, G., de Foy, B., Judd, L., and Goldberg, D. L.: An intercomparison of satellite, airborne, and ground-level observations with WRF–CAMx simulations of NO_2 columns over Houston, Texas, during the September 2021 TRACER-AQ campaign, *Atmos. Chem. Phys.*, 2024, 6719–6741, https://doi.org/10.5194/acp-24-6719-2024.

2023   Gu, Y., Henze, D.K., **Nawaz, M.O**., Wagner, U.J. Response of the ozone-related health burden in Europe to changes in local anthropogenic emissions of ozone precursors. *Environmental Research Letters.* 18(11). https://doi.org/10.1088/1748-9326/ad0167

2023   Jo, D., Nault, B.A., Tilmes, S., Gettelman, A., McCluskey, C., Hodzic, A., Henze, D.K., **Nawaz, M.O.**, Fung, K., Jimenez, J. Global Health and Climate Effects of Organic Aerosols from Different Sources. *Environmental Science and Technology*. 2023, 57, 37, 13793–13807. https://doi.org/10.1021/acs.est.3c02823

2023   **Nawaz, M.O.**, Henze, D.K., Huneeus, N.J., Osses, M., Álamos, N., Opazo, M., Gallardo, L., Sources of air pollution health impacts and co-benefits of carbon neutrality in

Santiago, Chile. *Journal of Geophysical Research: Atmospheres* 128(19)
https://doi.org/10.1029/2023JD038808

2023   **Nawaz, M. O.**, Henze, D. K., Anenberg, S. C., Ahn, D. Y., Goldberg, D. L., Tessum, C. W., & Chafe, Z. A. Sources of air pollution-related health impacts and benefits of radially applied transportation policies in 14 US cities. *Frontiers in Sustainable Cities*, 5. https://doi.org/10.3389/frsc.2023.1102493

2023   Gu, Y., Henze, D.K., **Nawaz, M.O.**, Cao, H. Wagner, U.J., Sources of PM2.5-associated health risks in Europe and corresponding emission-induced changes during 2005-2015. *GeoHealth* 2023. https://doi.org/10.1029/2022GH000767

2023   **Nawaz, M. O.**, Henze, D. K., Anenberg, S. C., Braun, C., Miller, J., & Pronk, E. A Source Apportionment and Emission Scenario Assessment of PM2.5- and O3-Related Health Impacts in G20 Countries. *GeoHealth*, *7*(1), e2022GH000713. https://doi.org/10.1029/2022GH000713

2022   Cao, H., Henze, D. K., Cady-Pereira, K., McDonald, B. C., Harkins, C., Sun, K., Bowman, K. W., Fu, T.-M., & **Nawaz, M. O.** COVID-19 Lockdowns Afford the First Satellite-Based Confirmation That Vehicles Are an Under-recognized Source of Urban NH3 Pollution in Los Angeles. *Environmental Science & Technology Letters*, *9*(1), 3–9. https://doi.org/10.1021/acs.estlett.1c00730

2021   **Nawaz, M. O.**, Henze, D. K., Harkins, C., Cao, H., Nault, B., Jo, D., Jimenez, J., Anenberg, S. C., Goldberg, D. L., & Qu, Z. (2021). Impacts of sectoral, regional, species, and day-specific emissions on air pollution and public health in Washington, DC. *Elementa: Science of the Anthropocene*, *9*(1), 00043. https://doi.org/10.1525/elementa.2021.00043

2021   Malley, C. S., Hicks, W. K., Kulyenstierna, J. C. I., Michalopoulou, E., Molotoks, A., Slater, J., Heaps, C. G., Ulloa, S., Veysey, J., Shindell, D. T., Henze, D. K., **Nawaz, M. O.**, Anenberg, S. C., Mantlana, B., & Robinson, T. P. Integrated assessment of global climate, air pollution, and dietary, malnutrition and obesity health impacts of food production and consumption between 2014 and 2018. *Environmental Research Communications*, *3*(7), 075001. https://doi.org/10.1088/2515-7620/ac0af9

2021   Nault, B. A., Jo, D. S., McDonald, B. C., Campuzano-Jost, P., Day, D. A., Hu, W., Schroder, J. C., Allan, J., Blake, D. R., Canagaratna, M. R., Coe, H., Coggon, M. M., DeCarlo, P. F., Diskin, G. S., Dunmore, R., Flocke, F., Fried, A., Gilman, J. B., Gkatzelis, G., … **Nawaz, M. O.**, … Jimenez, J. L. Anthropogenic Secondary Organic Aerosols Contribute Substantially to Air Pollution Mortality. *Atmospheric Chemistry and Physics Discussions*, 1–53. https://doi.org/10.5194/acp-21-11201-2021

2020   **Nawaz, M. O.**, & Henze, D. K. Premature Deaths in Brazil Associated With Long-Term Exposure to PM2.5 From Amazon Fires Between 2016 and 2019. *GeoHealth*, *4*(8), e2020GH000268. https://doi.org/10.1029/2020GH000268

Manuscripts Under Review (4)

Submitted **Nawaz, M.O.**, Goldberg, D.G., Kerr, G.H., Anenberg, S.C. TROPOMI satellite data reshape NO2 air pollution land-use regression modeling capabilities in the United States. *In Revision.*

Submitted Jin, L. Benoit, J. Ferrini Rodrigues, P. Miller, J. Alvarez, G., Osipova, L., Anenberg, S.C., **Nawaz, M.O.**, Henze, D.K., Wiecko, P. Current and future burden of mortality and paediatric asthma from transport-related policy measures. *Under Review.*

Submitted **Nawaz, M.O.** & Henze, D.K., Climate action can ameliorate, perpetuate, or exacerbate geopolitical air pollution inequities. *Under Review.*

Submitted Wiecko P., Henze, D.K., **Nawaz, M.O.,** Sector-, season-, and country-specific health benefits from anthropogenic emissions reductions. *Under Review.*

Manuscripts in Preparation (1)

In prep. **Nawaz, M.O.**, O'Donnell, K., Campbell, E., Anenberg, S.C., Ensuring health-conscious and equitable climate policy through fine-resolution modeling and clarified uncertainty.

PRESENTATIONS (23)

Invited (1)

2023 Using satellite data to characterize air pollution and health in cities and countries. April 27th. Environmental Defense Fund / Climate and Clean Air Coalition / United Nations Environmental Programme Workshop for Clean Air Solutions in Latin America and the Caribbean. Bogotá, Columbia.

Oral Presentation (11)

2024 **Nawaz, M.O.**, Anenberg, S.C., Goldberg, D.L., Kerr, G.H., Kondragunta, S. Development of a Land-Use Regression of Hourly Surface NO2 in preparation for GeoXO Atmospheric Composition Data. April 17th. European Geophysical Union. Vienna, Austria.

2024 **Nawaz, M.O.**, O'Dell, K., Anenberg, S.C., Goldberg, D.L., Kerr, G.H., He, J., McDonald, B., Kondragunta, S. Value of GeoXO Atmospheric Composition Data for Estimating Air Pollution-Related Health Impacts. January 30th. American Meteorological Society. Baltimore, MD, USA.

2023 **Nawaz, M.O.,** Henze, D.K., Anenberg, S.C., Goldberg, D.L., Investigating climate co-benefits using GEOS-Chem adjoint sensitivities. August 15th. Second GEOS-Chem Europe Meeting. London, UK.

2023 **Nawaz, M.O.,** Henze, D.K., Anenberg, S.C., Tessum, C. Regional vs local sources of municipal air pollution-related health impacts. January 10th. American Meteorological Society. (Presented by Henze). Denver, CO, USA.

2022 **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Huang, T. Developing an interactive tool for characterizing the air pollution-related health impacts in Los Angeles, CA associated with different proposed emission scenarios. July 19th. Earth Science Information Partners Meeting. Pittsburgh, PA, USA (Virtual).

2022 **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Harkins, C., Gallardo, L., Barazza Basoa, K. Leveraging satellite-derived data in GEOS-Chem adjoint simulations to characterize the sources of PM2.5-, O3-, and NO2-related health impacts at multiple spatial scales. June 9th. 10th International GEOS-Chem Meeting. St. Louis, MO, USA. (Virtual).

2022 **Nawaz, M.O.**, Henze, D.K., Braun, C., Miller, J., Pronk, E., Anenberg, S.C. Characterizing the sources of air pollution at the urban- and country-scale: case studies in Santiago, Chile and G20 countries. February 17th. Graduate Engineering Annual Research and Recruitment Symposium. Boulder, CO, USA.

2021 **Nawaz, M.O.**, D. Henze, S.C. Anenberg, C. Braun, J. Miller. Comparing domestic and extra-regional contributions to pollutant exposures and health impacts in G20 countries through a novel adjoint modeling approach. December 15th. American Geophysical Union Fall Meeting. New Orleans, LA, USA (Virtual).

2020 **Nawaz, M.O.**, D. Henze, D. Goldberg, S. Anenberg, D. Jo, B. Nault, J.L. Jimenez, H. Cao, C. Harkins, Z. Qu. Characterizing the regional, sectoral and species-specific sources of pollution exposure and its associated health impacts in urban environments: case studies in Washington, D.C. and Santiago, Chile. December 14th. American Geophysical Union. (Virtual)

2020 **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Goldberg, D. Premature deaths in Brazil associated with long-term exposure to PM2.5 from Amazon fires and development of a nested South American domain for the GEOS-Chem Adjoint. June 23rd. 19th GEIA Conference. (Virtual)

2019 **Nawaz, M.O.**, Henze, D.K. Source attribution of PM2.5 from sensitivity analyses in the GEOS-Chem adjoint model. October 25th. Young Scientists Symposium on Atmospheric Research. Fort Collins, CO, USA.

Poster (11)

2022 **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Harkins, C., Gallardo, L., Barazza Basoa, K. Leveraging satellite-derived data and air quality modeling to characterize source profiles of climate co-benefits at the urban- and country- scale. December 12th. American Geophysical Union. Chicago, IL, USA.

2020 **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, A. Van Donkelaar, R. Martin, M. L. Serre, J. J. West. Health benefits of decreases in PM2.5 and ozone in the United States, 1990-

2016. July 21st. NASA Health and Air Quality Applied Sciences Team Final Showcase. (Virtual).

2019 **Nawaz, M.O.**, D.K. Henze, S.C. Anenberg, D. Goldberg, Z. Qu (2019). Source attribution of PM2.5 and O3 concentrations and health outcomes from 2010 and 2011 in Washington D.C. using sensitivity analyses in the GEOS-Chem adjoint model. December 19th. American Geophysical Union, San Francisco, CA, USA

2019 **Nawaz, M.O.**, D.K. Henze, C.S. Malley, J.C.I. Kuylenstierna, H.W. Vallack, Y. Davila, S.C. Anenberg, S. Terry, A. Curry-Brown, N. Fann, E. Lefevre, C. Heaps, S. Penn, H. Roman, J. Neumann. Source attribution of climate and health impacts from aerosols. May 6th. 9th International GEOS-Chem Meeting, Cambridge, MA, USA.

2019 **Nawaz, M.O.**, Henze, D.K., The use of adjoint modeling to assess the sources of air pollution and its associated health impacts. February 21st. Graduate Engineering Annual Research and Recruitment Symposium. Boulder, CO, USA.

2018 **Nawaz**, **M.O.**, D. K. Henze, C. Malley, GH41C-1446: Source Attribution of Climate and Health Impacts from Aerosols. February 14th. AGU Fall Meeting. Washington, DC, USA.

2018 **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, A. van Donkelaar, R. V. Martin, J. J. West. Health benefits of decreases in PM2.5 and ozone in the United States, 1990-2015. July 16th. NASA Health and Air Quality Applied Sciences Team Meeting. Madison, WI, USA.

2018 **Nawaz, M.O.,** Y. Zhang, D. Q. Tong, A. van Donkelaar, R. V. Martin, J. J. West (2018). Health benefits of decreases in PM2.5 and ozone in the United States, 1990-2015. April 20th. Climate Change and Resilience Symposium. Chapel Hill, NC, USA.

2017 **Nawaz, M.O.,** Y. Zhang, D. Q. Tong, J. J. West. Health benefits of decreases in PM2.5 and ozone in the United States from 1990 to 2015. December 11th. American Geophysical Union. New Orleans, LA, USA.

2017 **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, J. J. West. Health benefits of decreases in PM2.5 and ozone in the United States from 1990 to 2015. October 23rd. Community Modeling and Analysis System Conference. Chapel Hill, NC, USA.

2017 **Nawaz M.O.**, Y. Zhang, West, J.J. Impact of regional ozone precursor emissions on global ozone burden. April 12th. Celebration of Undergraduate Research. Chapel Hill, NC, USA.