**M. OMAR NAWAZ**

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

**Email:** [nawaz.muhammad@email.gwu.edu](mailto:nawaz.muhammad@email.gwu.edu), **Nationality**: American / British

**RESEARCH EXPERIENCE**

**Postdoctoral Research Associate**

**National Resources Defense Council Health Science Policy Fellow**

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

2023 – Current

* Research fellow for one year, led team of researchers to incorporate health and equity analyses into National Resources Defense Council climate policy modelling.
* Led writing of under review NASA grant proposal ($1,000,000) for project to characterize compounding climate and air pollution hazards and project climate policy impacts.
* Used satellite remote-sensing of nitrogen dioxide (ESA TROPOMI) to build land-use regression and machine learning models for health and equity assessments.
* Investigated nitrogen dioxide in Houston, TX by comparing models, aircraft and satellite remote sensing, and ground-level monitors to understand emission underestimates.
* Invited to speak at UNEP / EDF workshop in Bogotá on clean air strategies for improving public health and advancing climate goals in Latin American countries.
* Wrote and contributed to scientific papers for peer-reviewed journals and attended multiple conferences and workshops to promote work.

**Ph.D. Research Assistant**

University of Colorado Boulder, Department of Mechanical Engineering

2018 – 2023

* Developed novel adjoint model approach that integrates remote-sensing data and health methods to consider climate and transportation policy impacts.
  + This method supported reduced-form tools including the NASA AQACF (NPO-52578-1), the ICCT FATE tool, and the SEI LEAP-IBC tool and it was used in subsequent studies by other researchers (Choi et al 2024; Gu et al. 2023a,b).
  + ICCT collaboration led to multiple additional co-designed consulting projects.
* Investigated how increased wildfires in Amazon from deforestation impacted air quality and health in Brazil, led to peer-reviewed paper and media coverage.
* Explored G20 net-zero health benefits, led to peer-reviewed paper and media coverage.
* Characterized the benefits of Chile’s NDCs from the Paris Climate Agreement compared to business as usual, led to peer-reviewed paper.

**M.S. Research Assistant**

University of North Carolina at Chapel Hill, Department of Environmental Engineering

2016-2018

* Developed GIS approach to integrate county-level disease rates from the US CDC, with remote-sensing derived pollution, and population data to estimate health impacts in US.

**GRANTS, AWARDS, AND FELLOWSHIPS**

**Accepted**

2024 Application of satellite observations in estimating NO2 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)

2023 National Resources Defense Council Health Science Policy Fellowship

2018 Outstanding Mechanical Engineering Research Potential Fellowship ($1000)

2018 1st place student poster Award, UNC 5th Climate Change Symposium ($100)

**Under Review**

2023 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)

**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)

**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 Department of Environmental Engineering, Gillings School of Global Public Health, University of North Carolina at Chapel Hill

Dissertation: *Benefits of reduced premature mortality from decreases in PM2.5 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, Minor in Astronomy**

2017 Department of Physics and Astronomy, University of North Carolina at Chapel Hill

**B.S. in Applied Mathematics**

2017 Department of Mathematics, University of North Carolina at Chapel Hill

**POSTGRADUATE TEACHING**

**Professorial Lecturer**

George Washington University

Fall 2024 (Beginning October 1st, 2024)

* Responsible for teaching *Global Climate Change and Air Pollution* (PuBH 6140) to graduate and undergraduate students.
* Responsible for developing and delivering lectures, seminars, and tutorials.
* Responsible for marking exams, homework, and essays.

**UNDERGRADUATE TEACHING**

**Lead Teaching Assistant**

University of Colorado Boulder, Supervised by Professor Daven Henze

Spring 2019

* Led tutorials and practicals for *Computational Methods* (MCEN 3030)
* Marked exams and homework
* Managed a group of graders and teaching assistants to support class of around 100 undergraduate students.

**Teaching Assistant**

University of Colorado Boulder, Supervised by Professor Jeffery Knutsen

Fall 2018

* Led tutorials and practicals for *Computational Methods* (MCEN 3030) for a class of around 100 undergraduate students.
* Marked exams and homework

**MENTORSHIP**

**Mentor**

George Washington University

2023-

* Trained and supported junior lab members in research methods, grant writing, integrating health and equity in climate policy modeling, and working with stakeholders.

**Mentor**

University of Colorado

2020-2023

* Trained and supported junior lab members in research methods, chemical transport modeling, air pollution health impact assessments, and Ph.D. examinations.

**Research Mentees**

Olivia Paquette (B.S. Student, Current)

Erin Campbell (M.P.H Student, Current)

Katie O’Donnell (M.P.H, Current)

Mohammed Alwakeel (B.S., 2021, next a mechanical engineer)

**PUBLICATIONS (20)**

**Refereed Journal Articles (14)**

2024 Choi, J., Henze, D.K., **Nawaz, M.O.,** Malley, C. Source attribution of health burdens from ambient PM2.5, O3, and NO2 exposure for assessment of South Korean national emission control scenarios by 2050. Accepted. *GeoHealth*.

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 NO2 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. *Under Review*.

Submitted Goldberg, D.G., de Foy, B., **Nawaz, M.O**; Johnson, J., Yarwood, G., Judd, L.,Identifying Sources of Urban NOx Emissions in Houston, Texas using Remote Sensing Aircraft Measurements and Source Apportionment Regression Models. *Under Review*.

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 Dyer, G., …, **Nawaz, M.O.**, … Nieuwenhuijsen, M.,Commentary: A road map for future urban health research. *Under Review*.

**Manuscripts in Preparation (2)**

In prep. **Nawaz, M.O.**, Henze, D.K., Climate action has the potential to ameliorate, perpetuate, or exacerbate geopolitical air pollution inequities.

In prep. **Nawaz, M.O.**, O’Donnell, K., Campbell, E., Anenberg, S.C., Commentary: Integrating health risk and equity into analyses of climate, energy, and environmental policies.

**PROFESSIONAL ASSOCIATIONS**

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](https://eos.org/research-spotlights/the-global-health-benefits-of-going-net-zero)

2020 [Queimadas na Amazônia aumentam internações](https://revistapesquisa.fapesp.br/queimadas-na-amazonia-aumentam-internacoes/)

**AD-HOC PEER-REVIEW FOR JOURNALS (16)**

*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)

*GeoHealth*: 2024 (1), 2023 (1)

*International Geoscience and Remote Sensing Symposium*: 2024 (6)

*Lancet Planet Health*: 2021 (1)

*Journal of the Air and Waste Management Association*: 2019 (1)

*Scientific Reports*: 2024 (1)

**REFERENCES**

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The University of North Carolina at Chapel Hill  
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**PRESENTATIONS (23)**

**Invited Talks**

2023 Using satellite data to characterize air pollution and health in cities and countries.

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. April 27th.

**Conference Presentations**

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. EGU 2024. Oral

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. AMS 2024. Oral

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. Oral

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

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. American Geophysical Union. December 12. Poster.

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. Earth Science Information Partners Meeting, July 19. Oral.

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. 10th International GEOS-Chem Meeting, June 9. Oral.

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. Graduate Engineering Annual Research and Recruitment Symposium, February 17. Oral.

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. American Geophysical Union Fall Meeting, December 15, New Orleans. Oral.

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. American Geophysical Union Fall Meeting, Dec. 14. Oral.

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. NASA Health and Air Quality Applied Sciences Team Final Showcase, July 21. Poster.

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. 19th GEIA Conference, June 23. Oral.

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. American Geophysical Union, San Francisco, CA, Dec. 19. Poster.

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

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. 9th International GEOS-Chem Meeting, Cambridge, MA, May 6. Poster.

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

2018 **Nawaz**, **M.O.**, D. K. Henze, C. Malley, GH41C-1446: Source Attribution of Climate and Health Impacts from Aerosols, AGU Fall Meeting, Washington D.C., Dec. 10 – 14. Poster.

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. NASA Health and Air Quality Applied Sciences Team meeting, July 16. Poster.

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. Climate Change and Resilience Symposium, April 20. Poster.

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. AGU Fall Meeting, December 11, New Orleans, LA. Poster.

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. CMAS Conference, October 23. Poster.

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