M. OMAR NAWAZ

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Milken Institute School of Public Health
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CURRENT POSITION

George Washington University Washington, DC
Postdoctoral Researcher 2023-Present

EDUCATION

University of Colorado at Boulder Boulder, CO
PhD, Mechanical Engineering 2023

University of North Carolina at Chapel Hill Chapel Hill, NC
MS, Environmental Science and Engineering 2018
BS, Applied Mathematics 2017
BS, Physics 2017
Minor, Astronomy 2017

RESEARCH EXPERIENCE

University of Colorado at Boulder Boulder, CO
PhD Research Assistant; Advisor: Daven K. Henze 2018-Present
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

- Developed methods for characterizing the sources of urban air pollution related health impacts using adjoint sensitivities of a chemical transport model
- Developed a new approach for characterizing the sensitivities of surface level NO_2 concentrations from satellite-derived TROPOMI columns to precursor emissions
- Set-up new domain for South America for the chemical transport model GEOS-Chem
- Estimated the air pollution related health impacts associated with emissions from Amazon fires
- Estimated the health benefits in G20 countries associated with the reduction of air pollutant precursor emissions
- Performed calculations for and supported the development of the Fast Assessment of Transportation Emissions (FATE) tool in collaboration with the ICCT
- Developed an emission projection urban health impact assessment tool as part of the NASA Air Quality Analytic Collaborative Framework (AQ ACF)

University of North Carolina at Chapel Hill Chapel Hill, NC
Graduate Research Assistant; Advisor: J. Jason West 2016-2018
Estimated trends in air pollution related health impacts in the United States

- Performed geospatial and temporal analyses of CMAQ simulated, kriged, and satellite-derived US pollutant concentrations to determine trends in pollution-related premature deaths
- Perturbed air pollution precursor emissions in CAM-Chem to assess regional weight of air pollution on global burden of pollution-related premature deaths
- Generated Bayesian maximum entropy kriging products of surface-level ozone and fine particulate matter using ground level observations

TEACHING EXPERIENCE

University of Colorado at Boulder Boulder, CO
Lead Teaching Assistant, Introduction to Computational Methods 2018-2019

PROFESSIONAL ASSOCIATIONS

American Geophysical Union 2018-Present

PUBLICATIONS

Nawaz, M.O., Henze, D.K., Anenberg, S.C., An assessment of the sources of air pollution-related health impacts and benefits associated with improvements in travel efficiency as a function of distance of policy implementation in fourteen US cities. *Frontiers in Sustainable Cities.* Accepted.

Nawaz, M.O., Henze, D.K., Anenberg, S.C., Braun, C., Miller, J., Pronk, E. A source apportionment and emission scenario assessment of $PM_{2.5}$- and O_3-related health impacts in G20 countries. *GeoHealth*. DOI: 10.1029/2022GH000713.

Cao, H., Henze, D.K., Cady-Pereira, K., McDonald, B.C., Harkins, C., Sun, K., Bowman, K.W., Fu, T., **Nawaz, M.O.** COVID-19 Lockdowns Afford the First Satellite-Based Confirmation That Vehicles Are an Under-recognized Source of Urban NH_3 Pollution in Los Angeles. *Environmental Science & Technology Letters* 2022. DOI: 10.1021/acs.estlett.1c00730

Nawaz, M.O., Henze, D.K., Harkins, C, Cao, H, Nault, B, Jo, D, Jimenez, J, Anenberg, SC, Goldberg, DL, Qu, Z. Impacts of sectoral, regional, species, and day-specific emissions on air pollution and public health in Washington, DC. *Elementa: Science of the Anthropocene* 2021. DOI: 10.1525/elementa.2021.00043

Malley, C.S., Hicks, W.K., Kulyenstierna, J.C., 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* 2021. DOI: 10.1088/2515-7620/ac0af9

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., Hamilton, J. F., Hanisco, T. F., Hayes, P. L., Henze, D. K., Hodzic, A., Hopkins, J., Hu, M., Huey, L. G., Jobson, B. T., Kuster, W. C., Lewis, A., Li, M., Liao, J., **Nawaz, M. O.**, Pollack, I. B., Peischl, J., Rappenglück, B., Reeves, C. E., Richter, D., Roberts, J. M., Ryerson, T. B., Shao, M., Sommers, J. M., Walega, J., Warneke, C., Weibring, P., Wolfe, G. M., Young, D. E., Yuan, B., Zhang, Q., de Gouw, J. A., and Jimenez, J. L. *Atmos. Chem. Phys.* 2021. Secondary organic aerosols from anthropogenic volatile organic compounds contribute substantially to air pollution mortality. DOI: 10.5194/acp-21-11201-2021, 2021.

Nawaz, M.O. & Henze, D.K. Premature Deaths in Brazil Associated With Long-Term Exposure to $PM_{2.5}$ From Amazon Fires Between 2016 and 2019. *GeoHealth* 2020. DOI: 10.1029/2020GH000268

Gu, Y., Henze, D.K., **Nawaz, M.O.**, Cao, H. Sources of $PM_{2.5}$-associated health risks in Europe and corresponding emission-induced changes during 2005-2015. *Under review*.

Nawaz, M.O., Henze, D.K., Huneeus, N.J, Opazod, M., Osses, M., Correa, N., Basoa Barazza, K., Gallardo, L. Assessment of co-benefits of carbon neutrality and sources of anthropogenic air pollution-related health impacts in Santiago, Chile. *To be submitted March 2023*.

Muralidharan, R., Zhang, Y., **Nawaz, M.O.**, Tong, D.Q., van Donkelaar, A., Martin, R.V., Serre, M.L., West, J.J., Changes in mortality in response to decreases in $PM_{2.5}$ and ozone concentrations across the United states from 1990 to 2020. *In preparation*.

MEDIA FEATURES

Queimadas na Amazônia aumentam internações

PRESENTATIONS

1. **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Huang, T. (2022). 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.

2. **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Harkins, C., Gallardo, L., Barazza Basoa, K. (2022). 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.

3. Gu, Y., Henze, D.K., **Nawaz, M.O.**, Cao, H. (2022). Sources of PM2.5 associated health risks in Europe and corresponding changes affected by the emission changes during 2005-2015. 10th International GEOS-Chem Meeting, June 9. Oral.

4. **Nawaz, M.O.**, Henze, D.K., Braun, C., Miller, J., Pronk, E., Anenberg, S.C. (2022). 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.

5. **Nawaz, M.O.**, D. Henze, S.C. Anenberg, C. Braun, J. Miller (2021). 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.

6. Muralidharan, R., Y. Zhang, T. Glotfelty, **Nawaz, M.O.**, D. Tong, A. van Donkelaar, R. Martin, M. L. Serre, J. J. West (2021). Changes in mortality in response to decreases in ozone and PM2.5 concentrations across the United States from 1990 to 2019. Community Modeling and Analysis System Conference, November 1. Poster.

7. Henze, D. K., **Nawaz, M.O.**, C. Lyu, S. Capps (2021). Observationally constrained source attribution modeling of air pollution health impacts. Meteorology and Climate - Modeling for Air Quality (MAC-MAQ), September 16. Oral.

8. Muralidharan, R., Y. Zhang, T. Glotfelty, **Nawaz, M.O.**, D. Tong, A. van Donkelaar, R. Martin, M. L. Serre, J. J. West (2021). Changes in mortality response to decreases in ozone and PM2.5 concentrations across the United States from 1990 to 2019. International Global Atmospheric Chemistry Conference, September 12. Oral.

9. Anenberg, S.C., M. Castillo, D. Goldberg, D. Henze, P. Kinney, D. Malashock, J. Marshall, A. Mohegh, **Nawaz, M.O.**, V. Southerland, C. Tessum, M. Brauer, Z. Chafe, M. Harris, C. Heaps, I. Kheirbek, G. Kleiman, J. Kuylenstierna, C. Malley, A. Roy, C. Thomas (2021). Recent Advances in Integrating Climate Change, Air Quality, and Public Health into Urban Decision-Making. American Meteorological Society, Jan. 15. Oral.

10. **Nawaz, M.O**., D. Henze, D. Goldberg, S. Anenberg, D. Jo, B. Nault, J.L. Jimenez, H. Cao, C. Harkins, Z. Qu (2020). 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.

11. **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, A. Van Donkelaar, R. Martin, M. L. Serre, J. J. West (2020). 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.

12. **Nawaz, M.O.**, Henze, D.K., Anenberg, S.C., Goldberg, D. (2020). 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.

13. Goldberg, D.L., S. Anenberg, A. Mohegh, B. de Foy, D. Griffin, C. McLinden, B. Duncan, N. Krotkov, L. Lamsal, F. Liu, **Nawaz, M.O.**, D. Henze, Z. Lu, D. Streets (2019) High-resolution NO2 exposure estimates and top-down NOx emissions using OMI NO2 and TROPOMI NO2. American Geophysical Union, San Francisco, CA, Dec. 19. Poster.

14. **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.

15. **Nawaz, M.O.**, Henze, D.K. (2019). Source attribution of $PM_{2.5}$ from sensitivity analyses in the GEOS-Chem adjoint model. Young Scientists Symposium on Atmospheric Research, October 25. Oral.

16. Henze, D. K., H. Cao , **Nawaz, M.O.**, C. Malley, (2019). Evaluation and application of remote sensing and air quality modeling for international health and climate assessment studies, European Commission Joint Research Centre, Ispra, Italy, Oct 3. Oral.

17. **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 (2019). Source attribution of climate and health impacts from aerosols. 9th International GEOS-Chem Meeting, Cambridge, MA, May 6. Poster.

18. Henze, D. K., F. Lacey, H. Cao , K. Brown, J. Milford, **Nawaz, M.O.**, (2019), Application of remote sensing and air quality models for constraining sources and impacts of air quality and greenhouse gas emissions, Johns Hopkins University, Department of Environmental Health and Engineering, Baltimore, MD, Apr 30. Oral.

19. Henze, D. K., F. Lacey, H. Cao , K. Brown, J. Milford, **Nawaz, M.O.**, (2019), Evaluation and application of remote sensing and air quality modeling for international health and climate assessment studies, Department of Mechanical Engineering, University of California Riverside, Apr 19. Oral.

20. **Nawaz, M.O.**, Henze, D.K. (2019), 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.

21. Henze, D. K., C. Malley, J. C. I. Kuylenstierna, R. W. Pinder, S. Terry, H. Vallack, C. Heaps, E. Lefevre, S. Anenberg, S. Penn, A. CurryBrown, N. Fann, J. Neumann, H. Roman, K. Hicks, Y. Davila , E. Marais, F. Lacey, **Nawaz, M.O.**, J. Choi , H. Lee (2019), Air quality and climate assessment tools and analyses to inform policy, American Association for the Advancement of Science (AAAS) 185th Annual Meeting, Panel Member for Transboundary Air Pollution: The Impact of Science on Policy, Washington D.C., Feb 16. Oral.

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

23. West, J. J., Y. Zhang, **Nawaz, M.O.**, D. Tong, A. van Donkelaar, R. Martin (2018). Changes in air pollution-related deaths in the United States since 1990. IGAC / iCACGP meeting, September 25, Takamatsu, Japan. Poster.

24. **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, A. van Donkelaar, R. V. Martin, J. J. West (2018). Health benefits of decreases in $PM_{2.5}$ and ozone in the United States, 1990-2015. NASA Health and Air Quality Applied Sciences Team meeting, July 16. Poster.

25. **Nawaz, M.O.,** Y. Zhang, D. Q. Tong, A. van Donkelaar, R. V. Martin, J. J. West (2018). Health benefits of decreases in $PM_{2.5}$ and ozone in the United States, 1990-2015. Climate Change and Resilience Symposium, April 20. Poster.

26. **Nawaz, M.O.,** Y. Zhang, D. Q. Tong, J. J. West, (2017). 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.

27. **Nawaz, M.O.**, Y. Zhang, D. Q. Tong, J. J. West (2017). Health benefits of decreases in PM2.5 and ozone in the United States from 1990 to 2015. CMAS Conference, October 23. Poster.

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