# M. OMAR NAWAZ, PhD

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# RESEARCH

#### Lecturer in Climate Change Science (Assistant Professor)

March 2025 – Current

Cardiff University, School of Earth and Environmental Sciences, Cardiff, UK

- Co-I for Wellcome Trust Award to use satellite observations of methane to estimate health benefits of reducing oil and gas emissions
- Convener and presenter at the European Geophysical Union 2025 Meeting
- EQUATOR mentor working towards equity in postgraduate geosciences research
- PI of ARRCA project to estimate surface pollution using TROPOMI (100k CPU hours)

#### Postdoctoral Research Associate with Dr. Susan C. Anenberg National Resources Defense Council Health Science Policy Fellow

February 2023 – February 2025

George Washington University, Milken Institute School of Public Health, Department of Environmental and Occupational Health, Washington, DC, USA

- Organized consulting projects (\$17,000 total) with the International Council on Clean Transportation to investigate how transportation policy could affect air quality and health
- Led team of researchers to integrate health and equity in climate policy modelling for the National Resources Defense Council as a Health Science Policy Fellow
- Developed multiple satellite-derived (TEMPO and TROPOMI) datasets of surface-level NO<sub>2</sub> including estimates featured in the Global Burden of Disease 2023 study
- Invited speaker at UNEP / EDF workshop in Bogotá, Colombia on clean air strategies to improve public health and advance climate goals

#### Doctoral Research Assistant with Dr. Daven K. Henze

#### August 2018 – January 2023

University of Colorado Boulder, Department of Mechanical Engineering, Boulder, CO, USA

- Developed novel method to integrate satellite remote sensing with adjoint modelling to identify air pollution sources, biomass burning impacts, and climate policy co-benefits
- Used adjoint modelling approach to develop reduced form tools: NASA AQACF (NPO-52578-1), the ICCT FATE tool, and the SEI LEAP-IBC tool and for studies by other researchers: Choi et al 2024; Gu et al. 2023a,b

#### Masters Research Assistant with Dr. J. Jason West

#### November 2016 - July 2018

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

 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 1<sup>st</sup> place student poster award at Climate Change symposium)

# **GRANTS AND CONTRACTS**

#### Current

2025-2026	Co-I Maximizing health benefits from reducing oil and gas emissions: novel
	approaches to health impact assessment. Wellcome Trust Discretionary Call
2025-2026	PI (100k CPU-hrs) Estimating UK surface-level pollution from satellite data using
	machine-learning and deterministic modeling. Supercomputing Wales Support
2024-2027	<b>Collaborator</b> (\$150,000) Application of satellite observations in estimating NO <sub>2</sub>
	concentrations, mortality burdens, and inequities. NASA ROSES FINESST F5

#### Pending

2025-2028	Other Personnel (\$550,000) Societal benefits of TEMPO NO2: Applications for
	air quality management and environmental justice. NASA ROSES TEMPO A21
2026	PI (75k Node-hrs) Forward and adjoint modeling of transboundary secondary
	PM <sub>2.5</sub> in response to climate mitigation: from health and equity impacts to
	uncertainties. UKRI Access to HPC.

#### Past

2024	Consultant (\$5,000) Study of Global Maritime Shipping-Attributable Health
	Impacts by the International Council on Clean Transportation (ICCT)
2023-2025	Consultant (\$12,000) Study of Global Transportation-Attributable Health Impacts
	by the International Council on Clean Transportation (ICCT)

#### **Competitive Grants Not Selected for Funding**

2024	<b>PI</b> (\$1,016,525) HEAD-IN: Assessing disaster risk and resilience action benefits
	associated with compound heat and air quality hazards, exposures, and
	vulnerabilities. NASA ROSES A42
2020	Future Investigator (\$150,000) 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 F5

### EDUCATION

#### PhD in Mechanical Engineering, Air Quality Focus

2018-2023 Department of Mechanical Engineering, University of Colorado Boulder 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

#### **MS in Environmental Engineering**

2017-2018 Department of Environmental Sciences and Engineering, Gillings School of Global Public Health, University of North Carolina Chapel Hill Benefits of reduced premature mortality from decreases in PM<sub>2.5</sub> and ozone in the United States from 1999 to 2015 Committee: Dr. J. Jason West (Advisor), Dr. Marc Serre, Dr. William Vizuete

#### BS in Physics, BS in Applied Mathematics, Minor in Astronomy

2013-2017 Department of Physics and Astronomy, University of North Carolina Chapel Hill 2013-2017 Department of Mathematics, University of North Carolina Chapel Hill

### **TEACHING**

2025 Fall	<b>Module Lead</b> for <b>The Ocean-Atmosphere System</b> * <i>Cardiff University, School of Earth and Environmental Sciences</i> Course for Year 2 Undergraduate Students
	Module Contributor for GIS, Maps, and Analytical Skills* Cardiff University, School of Earth and Environmental Sciences Course for Year 1 Undergraduate Students
2025 Summer	<b>Assessment Lead</b> for <b>Digital Fieldwork Workshop</b> <i>Cardiff University, School of Earth and Environmental Sciences</i> Course for Year 1 Undergraduate Students
2024 Fall	<b>Professorial Lecturer</b> for <b>Global Climate Change &amp; Air Pollution</b> George Washington University, Environmental and Occupational Health Department, Milken Institute School of Public Health Course for Postgraduate Students
2019 Spring	Lead Teaching Assistant for Computational Methods University of Colorado Boulder, Department of Mechanical Engineering Course for Undergraduate Students
2018 Fall	<b>Teaching Assistant</b> for <b>Computational Methods</b> University of Colorado Boulder, Department of Mechanical Engineering Course for Undergraduate Students

\* Indicates upcoming teaching for which planning has started

# **MENTORSHIP & ADVISING**

#### Doctoral

2024-2024 Soo-Yeon Kim Advised PhD researcher on NASA FINESST proposal that was funded

#### Masters

2025	Shivani Gundla
	EQUATOR mentee
2023-2024	Erin Campbell; Katie O'Donnell
	Led team of researchers to develop a report to advise the NRDC on approaches
	to integrate health and equity in climate policy modelling

#### Undergraduate

2025-	Niamh Delamar*; Elen Mai Evans*; Carwyn Jones*
2024	Olivia Paquette
2020-2021	Mohammed Alwakeel

\* Indicates dissertation mentee

# HONORS AND FELLOWSHIPS

2024-	GeoCAFE Scholar
2023-2024	National Resources Defense Council Health Science Policy Fellowship
2018	Outstanding Mechanical Engineering Research Potential Fellowship
2018	1 <sup>st</sup> place student poster Award, UNC 5 <sup>th</sup> Climate Change Symposium

### **PROFESSIONAL ASSOCIATIONS**

#### Current

2025-	EQUATOR Mentor
2024-	GeoCAFE Scholar
2024-	American Chemistry Society (ACS)
2024-	Global Burden of Disease Study Collaborator
2023-	European Geophysical Union
2018-	American Geophysical Union

Past

2023-2024 American Meteorological Society

### **MEDIA COVERAGE**

2023The Global Health Benefits of Going Net Zero2020Queimadas na Amazônia aumentam internações

# ACADEMIC SERVICE

#### Ad-Hoc Peer-Review for Journals (28)

Atmospheric Chemistry and Physics: 2024 (1) Discover Atmospheres: 2025 (1) Discover Cities: 2024 (1) Elementa: Science of the Anthropocene: 2021 (1) Environmental Monitoring & Assessment: 2025 (1) Environmental Research Letters: 2024 (1), 2025 (1) Environmental Science Policy Research: 2025 (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) NPJ Clean Air: 2025 (1) NPJ Climate & Atmospheric Science: 2025 (1) Lancet Planetary Health: 2021 (1) Journal of the Air and Waste Management Association: 2019 (1) Scientific Reports: 2024 (1)

#### Ad-Hoc Peer-Review for Proposals (1)

Wellcome Trust Expert Reviewer: 2025 (1)

#### **Department Service**

- 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 exams
- 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

#### **Professional Service**

• Student coordinator for the Community Modeling and Analysis System (CMAS) conference, Chapel Hill, NC

## **PUBLICATIONS (24)**

#### **Refereed Journal Articles (19)**

- 2025 Wiecko, P.; Henze, D.K.; Nawaz, M.O. Sector-, Season-, and Country-Specific NO2-Associated Health Benefits from NOx Emission Reductions. *ACS EST Air* 2025, *2*, 700–709, doi:10.1021/acsestair.5c00012.
- **2025** Nawaz, M.O.; Goldberg, D.L.; Kerr, G.H.; Anenberg, S.C. TROPOMI Satellite Data Reshape NO2 Air Pollution Land-Use Regression Modeling Capabilities in the United States. *ACS EST Air* **2025**, *2*, 187–200, doi:<u>10.1021/acsestair.4c00153</u>.
- 2025 Jin, L.; Benoit, J.; Nawaz, M.O.; Rodrigues, P.F.; Wiecko, P.; Miller, J.; Alvarez, G.; Henze, D.K.; Osipova, L.; Anenberg, S.C. Global Health Benefits of Policies to Reduce On-Road Vehicle Pollution through 2040. *Environ. Res. Lett.* 2025, doi:10.1088/1748-9326/adcd87.
- **2024** Nawaz, M.O.; Johnson, J.; Yarwood, G.; de Foy, B.; Judd, L.; Goldberg, D.L. An Intercomparison of Satellite, Airborne, and Ground-Level Observations with WRF– CAMx Simulations of NO<sub>2</sub> Columns over Houston, Texas, during the September 2021 TRACER-AQ Campaign. *Atmospheric Chemistry and Physics* **2024**, *24*, 6719–6741, doi:<u>10.5194/acp-24-6719-2024</u>.

- 2024 Goldberg, D.L.; de Foy, B.; Nawaz, M.O.; Johnson, J.; Yarwood, G.; Judd, L. Quantifying NOx Emission Sources in Houston, Texas Using Remote Sensing Aircraft Measurements and Source Apportionment Regression Models. ACS EST Air 2024, 1, 1391–1401, doi:10.1021/acsestair.4c00097.
- 2024 Dyer, G.M.C.; Khomenko, S.; Adlakha, D.; Anenberg, S.; Behnisch, M.; Boeing, G.; Esperon-Rodriguez, M.; Gasparrini, A.; Khreis, H.; Kondo, M.C.; ... Nawaz, M.O. ...; et al. Exploring the Nexus of Urban Form, Transport, Environment and Health in Large-Scale Urban Studies: A State-of-the-Art Scoping Review. *Environmental Research* 2024, *257*, 119324, doi:10.1016/j.envres.2024.119324.
- 2024 Dyer, G.M.C.; Khomenko, S.; Adlakha, D.; Anenberg, S.; Angelova, J.; Behnisch, M.; Boeing, G.; Chen, X.; Cirach, M.; de Hoogh, K.; ... Nawaz, M.O. ...; et al. Commentary: A Road Map for Future Data-Driven Urban Planning and Environmental Health Research. *Cities* 2024, *155*, 105340, doi:10.1016/j.cities.2024.105340.
- 2024 Choi, J.; Henze, D.K.; Nawaz, M.O.; Malley, C.S. 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* 2024, *8*, e2024GH001042, doi:10.1029/2024GH001042.
- **2023** Nawaz, M.O.; Henze, D.K.; Huneeus, N.J.; Osses, M.; Álamos, N.; Opazo, M.A.; Gallardo, L. Sources of Air Pollution Health Impacts and Co-Benefits of Carbon Neutrality in Santiago, Chile. *Journal of Geophysical Research: Atmospheres* **2023**, *128*, e2023JD038808, doi: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. *Front. Sustain. Cities* **2023**, *5*, doi:10.3389/frsc.2023.1102493.
- **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* **2023**, *7*, e2022GH000713, doi:10.1029/2022GH000713.
- 2023 Jo, D.S.; Nault, B.A.; Tilmes, S.; Gettelman, A.; McCluskey, C.S.; Hodzic, A.; Henze, D.K.; Nawaz, M.O.; Fung, K.M.; Jimenez, J.L. Global Health and Climate Effects of Organic Aerosols from Different Sources. *Environ. Sci. Technol.* 2023, *57*, 13793–13807, doi:10.1021/acs.est.3c02823
- 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, *7*, e2022GH000767, doi:10.1029/2022GH000767.

- **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. *Environ. Res. Lett.* **2023**, *18*, 114034, doi:<u>10.1088/1748-9326/ad0167</u>.
- 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. *Environ. Sci. Technol. Lett.* 2022, *9*, 3–9, doi: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. Impacts of Sectoral, Regional, Species, and Day-Specific Emissions on Air Pollution and Public Health in Washington, DC. *Elementa: Science of the Anthropocene* 2021, *9*, 00043, doi:10.1525/elementa.2021.00043.
- 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.; ... Nawaz, M.O. ...; et al. Secondary Organic Aerosols from Anthropogenic Volatile Organic Compounds Contribute Substantially to Air Pollution Mortality. *Atmospheric Chemistry and Physics* 2021, *21*, 11201–11224, doi:10.5194/acp-21-11201-2021.
- 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.; ... Nawaz, M.O. ...; et al. Integrated Assessment of Global Climate, Air Pollution, and Dietary, Malnutrition and Obesity Health Impacts of Food Production and Consumption between 2014 and 2018. Environ. Res. Commun. 2021, 3, 075001, doi:10.1088/2515-7620/ac0af9.
- **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* **2020**, *4*, e2020GH000268, doi:<u>10.1029/2020GH000268</u>.

#### Manuscripts Under Review (3)

- Submitted **Nawaz, M.O.** & Henze, D.K., Climate action can ameliorate, perpetuate, or exacerbate geopolitical air pollution inequities. *In Revision.*
- Submitted **Nawaz, M.O.**, Huber, D.E., Kerr, G.H., Judd, L.M., Acker, S.J., Goldberg, D.L., A comparative analysis of TEMPO NO<sub>2</sub> remote sensing with surface-level monitoring through diurnal and seasonal trends, meteorology, and monitor characteristics. *Under Review*.
- Submitted Goldberg, D.L., **Nawaz, M.O.**, Lyu, C., He, J., McDonald, B., Kondragunta, S., Carlton, A.G., Anenberg, S.C. NO<sub>2</sub> concentrations are different under clear versus cloudy skies and its implications for satellite measurements. *In Revision*.

#### Manuscripts In Preparation (2)

- In Prep. Siu, T.K., Goldberg, D.L., Kerr, G.H., Chen, L., **Nawaz, M.O.**, Chang, R.Y.W., Fong, K.C. Tropospheric NO<sub>2</sub> Patterns in Eastern Canada Using the First-year TEMPO Observations. *In preparation*.
- In Prep. Kerr, G.H., **Nawaz**, **M.O.**, Anenberg, S.C., Anthoff, D., Burton, C., Carter, T.S., Kelley, D.I., Kingdon, C., O'Dell, K., Prest, B.C., Cromar, K.R. Surging public health damages from wildland fire-sourced pollution: Global projections of climate-driven changes to 2100. *In preparation.*

# **PRESENTATIONS (24)**

#### Invited (1)

2023 Using satellite data to characterize air pollution and health in cities and countries. April 27<sup>th</sup>. 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 17<sup>th</sup>. 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 30<sup>th</sup>. American Meteorological Society. Baltimore, MD, USA.
- 2023 Nawaz, M.O., Henze, D.K., Anenberg, S.C., Goldberg, D.L., Investigating climate cobenefits using GEOS-Chem adjoint sensitivities. August 15<sup>th</sup>. 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 10<sup>th</sup>. 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 19<sup>th</sup>. 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 9<sup>th</sup>. 10<sup>th</sup> 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 17<sup>th</sup>. 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 15<sup>th</sup>. 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 14<sup>th</sup>. 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 23<sup>rd</sup>. 19<sup>th</sup> 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 25<sup>th</sup>. Young Scientists Symposium on Atmospheric Research. Fort Collins, CO, USA.

#### Poster (12)

- 2024 **Nawaz, M.O.,** Goldberg, D.L., Kerr, G.H., Anenberg, S.C., What can TROPOMI and TEMPO remote sensing reveal about seasonal and diurnal trends in surface-level NO<sub>2</sub>? December 13<sup>th</sup>. American Geophysical Union. Washington, DC, USA.
- 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 12<sup>th</sup>. 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 21<sup>st</sup>. 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 19<sup>th</sup>. 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 6<sup>th</sup>. 9th International GEOS-Chem Meeting, Cambridge, MA, USA.

- **Nawaz, M.O.**, Henze, D.K., The use of adjoint modeling to assess the sources of air pollution and its associated health impacts. February 21<sup>st</sup>. Graduate Engineering Annual Research and Recruitment Symposium. Boulder, CO, USA.
- **Nawaz**, **M.O.**, D. K. Henze, C. Malley, GH41C-1446: Source Attribution of Climate and Health Impacts from Aerosols. February 14<sup>th</sup>. AGU Fall Meeting. Washington, DC, USA.
- **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 16<sup>th</sup>. NASA Health and Air Quality Applied Sciences Team Meeting. Madison, WI, USA.
- **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 20<sup>th</sup>. Climate Change and Resilience Symposium. Chapel Hill, NC, USA.
- **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 11<sup>th</sup>. American Geophysical Union. New Orleans, LA, USA.
- **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 23<sup>rd</sup>. Community Modeling and Analysis System Conference. Chapel Hill, NC, USA.
- **Nawaz M.O.**, Y. Zhang, West, J.J. Impact of regional ozone precursor emissions on global ozone burden. April 12<sup>th</sup>. Celebration of Undergraduate Research. Chapel Hill, NC, USA.