Zolal Ayazpour

Contact Information

Harvard-Smithsonian Center for Astrophysics
60 Garden Street
Cambridge, MA 02138 USA

E-mail: zolal.ayazpour@cfa.harvard.edu
https://zolal-ayazpour.github.io

Education

Doctor of Philosophy, Environmental Engineering (GPA: 4/4) — May 2019 – May 2025
Specialization: Atmospheric Remote Sensing
University at Buffalo, Buffalo, NY, USA

Master of Science, Water Resources Engineering and Management — October 2015 – June 2018
University of Stuttgart, Stuttgart, Germany

Bachelor of Science, Civil Engineering — September 2009 – July 2013
University of Tehran, Tehran, Iran

Research Experience

Physicist (Postdoctoral Research Fellow) — July 2025 – Present
Smithsonian Astrophysical Observatory
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA

Research Scientist — June 2025 – July 2025
Department of Civil, Structural and Environmental Engineering
University at Buffalo, Buffalo, NY, USA

Predoctoral Research Fellow — March 2023 – May 2025
Smithsonian Astrophysical Observatory
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA
(Advisors: Gonzalo González Abad and Caroline R. Nowlan)

Visiting Ph.D. Student — May 2020 – February 2023
Smithsonian Astrophysical Observatory
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA
(Advisors: Gonzalo González Abad and Caroline R. Nowlan)

Graduate Research Assistant — May 2019 – May 2025
Department of Civil, Structural and Environmental Engineering
University at Buffalo, Buffalo, NY, USA
(Advisor: Kang Sun)

Graduate Research Assistant — November 2017 – September 2018
ISWA Institute for Sanitary Engineering, Water Quality and Solid Waste Management
University of Stuttgart, Stuttgart, Germany
(Advisor: Ulrich Dittmer)

Undergraduate Researcher — June 2011 – June 2012
Department of Civil Engineering
University of Tehran, Tehran, Iran
(Advisor: Mohammad Shekarchizadeh)

Honors and Awards

Graduate Research Award — May 2025
University at Buffalo

SAO Predoctoral Fellowship March 2023 – May 2025
Harvard-Smithsonian Center for Astrophysics

AGU Student Travel Grant December 2022
American Geophysical Union

Robert P. Apmann Memorial Award May 2020
University at Buffalo

DAAD Scholarship June 2015 – March 2018
German Academic Exchange Service

National Scholarship September 2009 – July 2013
University of Tehran

Teaching experience

Teaching Assistant, Air Pollution, University at Buffalo — Spring 2025

Guest lecturer, Introduction to Python, University at Buffalo — September 2024

Guest lecturer, Environmental Fluid Mechanics, University at Buffalo — Sep 2021 & Aug 2022

Co-Instructor, Air Pollution, University at Buffalo — Spring 2022

Guest lecturer, Introduction to MATLAB and Python, University at Buffalo — March 2021

Teaching Assistant, Calculus II, University of Tehran — Fall 2010 & Spring 2013

Instructor, Mathematics and Physics, Kherad High School — September 2010 – June 2011

Publications

Submitted Manuscripts

J. He, L. Zhang, R. H. Schwantes, B. D. Baker, L. W. Horowitz, V. Naik, C. Lyu, Z. Moon, G. A. A. Grell, R. Ahmadov, J. Schnell, K. Yang, Z. Wei, S. Wang, K. Chang, A. M. Gorchov Negron, A. Zhu, S. Kondragunta, E. C Apel, I. Bourgeois, R. Commane, S. R Hall, A. J. Hills, R. S. Hornbrook, J. Peischl, K. Ullmann, G. González Abad, **Z. Ayazpour**, C. R. Nowlan, B. McDonald (2025). Incorporating gas-phase chemistry into the Unified Forecast System (UFS) for global air quality applications. [preprint for Journal of Advances in Modeling Earth Systems]. DOI: 10.22541/essoar.175130532.28945101/v1.

Journal Articles

Z. Ayazpour, K. Sun, R. Zhang, H. Shen (2025). Evaluation of the Directional Derivative Approach for Timely and Accurate Satellite-based Emission Estimation Using Chemical Transport Model Simulation of Nitrogen Oxides. Journal of Geophysical Research: Atmospheres, 130, e2024JD042817. DOI: 10.1029/2024JD042817.

D. Gautam, S. Philip, S. Dey, M. Johnson, E. Chaudhary, **Z. Ayazpour**, G. González Abad (2025). Assessing Ambient Formaldehyde Exposure and Estimating Cancer Risks over India using the Ozone Monitoring Instrument Satellite Sensor. ACS ES&T Air. DOI: 10.1021/acsestair.4c00188.

Z. Ayazpour, G. González Abad, C. R. Nowlan, K. Sun, H. A. Kwon, C. C. Miller, H. Chong, H. Wang, X. Liu, K. Chance, E. O'Sullivan, L. Zhu, C. Vigouroux, I. De Smedt, et al. (2025). Aura Ozone Monitoring Instrument (OMI) Collection 4 Formaldehyde Products. Earth and Space Science, 12, e2024EA003792. DOI: 10.1029/2024EA003792.

J. Liao, G. M. Wolfe, A. E. Kotsakis, J. M. Nicely, J. M. St. Clair, T. F. Hanisco, G. González Abad, C. R. Nowlan, **Z. Ayazpour**, I. De Smedt, E. C. Apel, and R. S. Hornbrook (2025). Validation of formaldehyde products from three satellite retrievals (OMI SAO, OMPS-NPP SAO, and OMI BIRA) in the marine atmosphere with four seasons of Atmospheric Tomography Mission (ATom) aircraft observations. Atmospheric Measurement Techniques, 18, 1–16. DOI: 10.5194/amt-18-1-2025.

H. A. Kwon, G. González Abad, C. C. Miller, K. Hall, C. R. Nowlan, E. O'Sullivan, H. Wang, H. Chong, **Z. Ayazpour**, X. Liu, K. Chance (2024). Updated OMI Glyoxal Column Measure-

ments Using Collection 4 Level 1B Radiances. Earth and Space Science, 11, e2024EA003705. DOI: 10.1029/2024EA003705.

T. Zhao, J. Mao, **Z. Ayazpour**, G. González Abad, C. R. Nowlan, and Y. Zheng (2024). Interannual variability of summertime formaldehyde (HCHO) vertical column density and its main drivers at northern high latitudes. Atmospheric Chemistry and Physics, 24, 6105–6121. DOI: 10.5194/acp-24-6105-2024.

H. Chong, G. González Abad, C. R. Nowlan, C. C. Miller, A. Saiz-Lopez, R. P. Fernandez, H. A. Kwon, **Z. Ayazpour**, H. Wang, A. H. Souri, X. Liu, K. Chance, E. O'Sullivan, J. Kim, J. H. Koo, W. R. Simpson, F. Hendrick, R. Querel, G. Jaross, C. Seftor, and R. M. Suleiman (2024). Global retrieval of stratospheric and tropospheric BrO columns from the Ozone Mapping and Profiler Suite Nadir Mapper (OMPS-NM) on board the Suomi-NPP satellite. Atmospheric Measurement Techniques, 17, 2873–2916. DOI: 10.5194/amt-17-2873-2024.

D. C. Anderson, B. N. Duncan, J. Liu, J. M. Nicely, S. A. Strode, M. B. Follette-Cook, A. H. Souri, J. R. Ziemke, G. González Abad, and **Z. Ayazpour** (2024). Trends and Interannual Variability of the Hydroxyl Radical in the Remote Tropics During Boreal Autumn Inferred From Satellite Proxy Data, Geophysical Research Letters, 51, e2024GL108531. DOI: 10.1029/2024GL108531.

H. Wang, G. González Abad, C. C. Miller, H. A. Kwon, C. R. Nowlan, **Z. Ayazpour**, H. Chong, X. Liu, K. Chance, E. O'Sullivan, K. Sun, R. Spurr, and R. J. Hargreaves (2023). Development of the MEaSUREs blue band water vapor algorithm – Towards a long-term data record. Atmospheric Measurement Techniques Discussion [preprint]. DOI: 10.5194/amt-2023-66.

C. R. Nowlan, G. González Abad, H. A. Kwon, **Z. Ayazpour**, C. C. Miller, K. Chance, H. Chong, X. Liu, E. O'Sullivan, H. Wang, L. Zhu, I. De Smedt, G. Jaross, C. Seftor, and K. Sun (2023). Global Formaldehyde Products from the Ozone Mapping and Profiler Suite (OMPS) Nadir Mappers on Suomi NPP and NOAA-20. Earth and Space Science, 10, e2022EA002643. DOI: 10.1029/2022EA002643.

C. Howlett, G. González Abad, C. C. Miller, C. R. Nowlan, **Z. Ayazpour**, and L. Zhu (2023). The influence of snow cover on Ozone Monitor Instrument formaldehyde observations. Atmósfera, 37, 159–174. DOI: 10.20937/ATM.53134.

Z. Ayazpour, S. Tao, D. Li, A. J. Scarino, R. E. Kuehn, and K. Sun (2023). Estimates of spatially complete, observational data-driven planetary boundary layer height over the contiguous United States. Atmospheric Measurement Techniques, 16, 563–580. DOI: 10.5194/amt-16-563-2023.

Conference Paper

Z. Ayazpour, A. E. Bakhshipour, U. Dittmer (2019). Combined Sewer Flow Prediction Using Hybrid Wavelet Artificial Neural Network Model. International Conference on Urban Drainage Modelling 2018, Springer, p. 693–8. DOI: 10.1007/978-3-319-99867-1_120.

Selected Conference Presentations

Z. Ayazpour, K. Sun, C. R. Nowlan, and G. González Abad, Investigating Agricultural NOx Emissions Using Observations from New Generation Satellite Instruments, AGU Fall Meeting, New Orleans, LA, December 2025.

Z. Ayazpour, G. González Abad, C. R. Nowlan, K. Sun, H. A. Kwon, C. C. Miller, H. Chong, H. Wang, X. Liu, K. Chance, E. O'Sullivan, L. Zhu, C. Vigouroux, I. De Smedt, et al., Aura Ozone Monitoring Instrument (OMI) Collection 4 Formaldehyde Product, OMI-TROPOMI Meeting, Boulder, CO, June 2024.

Z. Ayazpour, K. Sun, C. R. Nowlan, and G. González Abad, Quantification of NOx Emissions from Power-Generating Facilities over the US using Satellite Observations and intercomparison with Ground Measurements, AGU Fall Meeting, San Francisco, CA, December 2023.

Z. Ayazpour, G. González Abad, C. R. Nowlan, H. A. Kwon, C. C. Miller, H. Chong, K. Sun, E. O'Sullivan, H. Wang, X. Liu, K. Chance, A Consistent Long-Term Global Data Record of Formaldehyde from UV-Visible Satellite Instruments, AGU Fall Meeting, San Francisco, CA, December 2023.

Z. Ayazpour, K. Sun, C. R. Nowlan, and G. González Abad, Estimating Short-lived Air Pollutant Emissions in the United States Using New Generation Satellite Observations, AGU Fall Meeting,

Chicago, IL, December 2022.

Z. Ayazpour, K. Sun, S. Tao, and D. Li, Estimates of spatially complete, observational data-driven planetary boundary layer height over the contiguous United States, TEMPO Science Team Meeting (virtual), June 2022.

Z. Ayazpour, K. Sun, C. C. Miller, C. R. Nowlan, E. O'Sullivan, and G. González Abad, Aura Ozone Monitoring Instrument (OMI) Version-4 Formaldehyde Product, AGU Fall Meeting, New Orleans, LA, December 2021.

Z. Ayazpour, K. Sun, C. C. Miller, C. R. Nowlan, E. O'Sullivan, and G. González Abad, Improving the Spectral Fit of NASA's OMI Formaldehyde Operational Product, AGU Fall Meeting (virtual), December 2020.

Z. Ayazpour and K. Sun, TROPOMI Observations of the Atmospheric Composition over the Middle East, AMS Annual Meeting, Boston, MA, January 2020.

Z. Ayazpour and K. Sun, High-Resolution Satellite Remote Sensing of the Atmospheric Composition over the Middle East, AGU Fall Meeting, San Francisco, CA, December 2019.

Z. Ayazpour, A. E. Bakhshipour, and U. Dittmer, Combined sewer flow prediction using hybrid wavelet artificial neural network model, Urban Drainage Modeling Conference, Palermo, Italy, September 2018.

Work Experience

Civil and Environmental Engineer January 2014 – April 2015

Pazhoohesh Omran Rahvar (P.O.R) Consulting Engineers, Tehran, Iran

Civil Engineer Intern September 2013 – October 2013

HYETOS Consulting Engineers, Thessaloniki, Greece

- This internship was offered by International Association for the Exchange of Students for Technical Experience (IAESTE)

Civil Engineer Intern June 2012 – September 2012

KAYSON INC., Tehran, Iran

Professional Activities and Societies

Reviewer for Peer-Reviewed Journals

Remote Sensing of Environment; Atmospheric Pollution Research; Atmospheric Environment: X; Journal of Hazardous Materials; ACS Omega; Journal of Atmospheric and Solar-Terrestrial Physics; Measurement; Remote Sensing; Sustainability

Board member

Member of the Postdoc Council at Harvard-Smithsonian Center for Astrophysics, February 2026 – Present

Member of the Equity, Diversity, Inclusion, & Belonging Committee at Harvard-Smithsonian Center for Astrophysics, December 2023 – January 2025

Vice president of the American Society of Civil Engineers - Environmental & Water Resources Institute Student Chapter at University at Buffalo, September 2021 – December 2022

Executive officer of the American Society of Civil Engineers - Environmental & Water Resources Institute Student Chapter at University at Buffalo, September 2019 – August 2020

Executive officer of the Civil, Structural & Environmental Engineering Graduate Student Association at University at Buffalo, September 2019 – August 2020

Executive officer of the Scientific Association of Civil Engineering at University of Tehran, September 2011 – August 2015

Outreach

Organizer for Astro REU (Research Experience for Undergraduates) interns, Harvard-Smithsonian Center for Astrophysics, January 2026 – March 2026

Volunteer at Cambridge Explores the Universe event, Harvard-Smithsonian Center for Astrophysics, Fall 2025 and Fall 2023

Mentor for CREATE (Research Experiences in Astronomy, Technology, & Engineering) interns, Harvard-Smithsonian Center for Astrophysics, June 2024 – August 2024

Member

American Geophysical Union, European Geosciences Union, American Meteorological Society

Technical Skills

Languages
Persian (native), English (proficient), German and Arabic (basic knowledge)

Programming
Python, MATLAB, R, FORTRAN, Linux Shell

Software
RStudio, LaTeX, ArcGIS, Autodesk AutoCAD

High performance computing
High performance computing using computing clusters at University at Buffalo and Smithsonian Institution.

References

Dr. Gonzalo González Abad
Physicist
Atomic and Molecular Physics Division, Harvard-Smithsonian Center for Astrophysics
ggonzalezabad@cfa.harvard.edu

Dr. Kang Sun
Associate Professor
Department of Civil, Structural and Environmental Engineering, University at Buffalo
kangsun@buffalo.edu

Dr. Caroline R. Nowlan
Physicist
Atomic and Molecular Physics Division, Harvard-Smithsonian Center for Astrophysics
cnowlan@cfa.harvard.edu