

# Zhongju (Hugh) Li

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## CURRENT POSITION

**National Energy Technology Laboratory**  
Postdoctoral Research Associate

Pittsburgh, PA  
July 2018 - present

## EDUCATION

**Carnegie Mellon University**  
Postdoctoral Research Associate  
Advisor: Prof. Albert A. Presto

Pittsburgh, PA  
Feb. 2018 - June 2018

**Carnegie Mellon University**  
Doctor of Philosophy in Mechanical Engineering  
Advisor: Prof. Albert A. Presto  
Thesis: Urban Aerosol: Spatiotemporal Variation & Source Characterization  
GPA: 3.8/4.0

Pittsburgh, PA  
Jan. 2018

Selected Coursework: Combustion and Air Pollution Control, Air Quality Engineering, Climate Science & Policy, Aerosol Measurement Technology, Advanced Thermodynamics, Advanced Heat Transfer, Numerical Methods in Engineering

**Wuhan University of Technology**  
Bachelor of Engineering in Automotive Engineering  
GPA: 3.7/4.0

Wuhan, China  
June 2013

Selected Coursework: Automotive Emission and Noise Control, Automotive Electrical & Electronic Systems, Principle of Engine, Automotive & Engine Manufacturing Technology, Theory of Automobile, Automobile Design, Automotive Quality Inspection & Performance Test

## SKILLS

**Programming Languages:** R, MATLAB, Igor, Python, SQL, C

**Data Visualization:** ArcMap, ArcGIS Pro, QGIS, Igor

**Computer Skills:** MS Office, Adobe InDesign

**Instrumentation:** Low-cost air quality sensors, Cavity ring-down spectroscopy,  $\delta^{13}\text{C}$  isotope analyzer, Scanning mobility particle sizer, Fast mobility particle sizer, Aethalometer, Condensation particle counter, Aerosol mass spectrometry, Sunset OC/EC analyzer, Gas monitor

**Subject Area Skills:** Positive matrix factorization, Gaussian dispersion modeling, OTM-33A, HYSPLIT, EPA National Emission Inventory, Greenhouse Gas Inventory, Bootstrapping, Land-use regression, Field work

**Languages:** English (Proficient), Mandarin (Native Speaker)

## PEER-REVIEWED JOURNAL ARTICLES

Li HZ, Mundia-Howe M, Reeder MD, Pekney NJ. "Constraining Natural Gas Pipeline Emissions in San Juan Shale Using Mobile Sampling." *Sci. Total Environ.* **2020**, <https://doi.org/10.1016/j.scitotenv.2020.142490>

Li HZ, Mundia-Howe M, Reeder MD, Pekney NJ. "Gathering Pipeline Methane Emissions in Utica Shale Using Unmanned Aerial Vehicle and Ground-based Mobile Sampling." *Atmosphere.* **2020**, <https://doi.org/10.3390/atmos11070716>

Li HZ, Reeder MD, Pekney NJ. "Quantifying Source Contributions of Volatile Organic Compounds under Hydraulic Fracking Moratorium." *Sci. Total Environ.* **2020**, <https://doi.org/10.1016/j.scitotenv.2020.139322>

Ye Q\*, Li HZ\*, Gu P, Robinson ES, Apte JS, Sullivan RC, Robinson AL, Donahue NM, Presto AA. "Moving Beyond Fine Particle Mass: High-spatial Resolution Exposure to Source-resolved Atmospheric Particle Number and Chemical Mixing State." *Environ. Health Perspect.* **2020**, <https://doi.org/10.1289/EHP5311>

\*equal contribution

Li HZ, Reeder MD, Litten J, Pekney NJ. "Identifying Under-characterized Atmospheric Methane Emission Sources in Western Maryland." *Atmos. Environ.* **2019**, <https://doi.org/10.1016/j.atmosenv.2019.117053>

Zimmerman N, Li HZ, Ellis AA, Hauryliuk A, Robinson ES, Gu P, Shah R, Ye Q, Snell L, Subramanian R, Robinson AL, Apte JS, Presto AA. “Improving Correlations between Land Use and Air Pollutant Concentrations Using Wavelet Analysis: Insights from a Low-cost Sensor Network.” *Aerosol Air Qual. Res.* **2019**, <https://doi.org/10.4209/aaqr.2019.03.0124>

Robinson ES, Shah RU, Messier K, Gu P, Li HZ, Apte JS, Robinson AL, Presto AA. “Land Use Regression Modeling of Source-resolved Particulate Matter Components from Mobile Sampling.” *Environ. Sci. Technol.* **2019**, <https://doi.org/10.1021/acs.est.9b01897>

Gu P, Dallmann TR, Li HZ, Tan Y, Presto AA. “Quantifying Urban Spatial Variations of VOC Concentrations and Source Contributions with a Mobile Sampling Platform.” *Int. J. Environ. Res. Public Health* **2019**, <https://doi.org/10.3390/ijerph16091632>

Saha P, Li HZ, Apte JS, Robinson AL, Presto AA. “Urban Ultrafine Particle Exposure Assessment with Land-Use Regression: Influence of Sampling Strategy.” *Environ. Sci. Technol.* **2019**, <https://doi.org/10.1021/acs.est.9b02086>

Li HZ, Gu P, Ye Q, Zimmerman N, Robinson ES, Subramanian R, Apte JS, Robinson AL, Presto AA. “Spatially Dense Air Pollutant Sampling: Implications of Spatial Variability on the Representativeness of Stationary Air Pollutant Monitors.” *Atmos. Environ.* **2019**, <https://doi.org/10.1016/j.aeaoa.2019.100012>

Saha P, Zimmerman N, Malings C, Hauryliuk A, Li HZ, Snell L, Subramanian R, Lipsky E, Apte JS, Robinson AL, Presto AA. “Quantifying High-resolution Spatial Variations and Local Source Impacts of Urban Ultrafine Particle Concentration.” *Sci. Total Environ.* **2019**, <https://doi.org/10.1016/j.scitotenv.2018.11.197>

Gu P, Li HZ, Ye Q, Robinson ES, Apte JS, Robinson AL, Presto AA. “Intracity Variability of Particulate Matter Exposure Is Driven by Carbonaceous Sources and Correlated with Land-Use Variables.” *Environ. Sci. Technol.* **2018**, <https://doi.org/10.1021/acs.est.8b03833>

Robinson ES, Gu P, Ye Q, Li HZ, Shah RU, Apte JS, Robinson AL, Presto AA. “Restaurant Impacts on Outdoor Air Quality: Elevated Organic Aerosol Mass from Restaurant Cooking with Neighborhood-scale Plume Extents.” *Environ. Sci. Technol.* **2018**, <https://doi.org/10.1021/acs.est.8b02654>

Ye Q, Gu P, Li HZ, Robinson ES, Lipsky E, Kaltsonoudis C, Lee A, Apte JS, Robinson AL, Sullivan RC, Presto AA, Donahue NM. “Characterization of Spatial Variability of Sources and Mixing State of Single Particles in a Metropolitan Area.” *Environ. Sci. Technol.* **2018**, <https://doi.org/10.1021/acs.est.8b01011>

Li HZ, Dallmann TR, Li X, Gu P, Presto AA. “Urban Organic Aerosol Exposure: Spatial Variations in Composition and Source Impacts.” *Environ. Sci. Technol.* **2017**, <https://doi.org/10.1021/acs.est.7b03674>

Li HZ, Dallmann TR, Gu P, Presto AA. “Application of Mobile Sampling to Investigate Spatial Variation in Fine Particle Composition.” *Atmos. Environ.* **2016**, 142, 71–82. <https://doi.org/10.1016/j.atmosenv.2016.07.042>

### **BOOK CHAPTERS**

Donahue NM, Posner LN, Westervelt DM, Li HZ, Shrivastava M, Presto AA, Sullivan RC, Adams PJ, Pandis SN, Robinson AL. “Where Did This Particle Come From? Sources of Particle Number and Mass for Human Exposure Estimates, in: *Airborne Particulate Matter: Sources, Atmospheric Processes and Health.*” The Royal Society of Chemistry, **2016**, pp 35–71. <http://dx.doi.org/10.1039/9781782626589-00035>

### **CONFERENCES & PRESENTATIONS**

Li HZ, Saint-Vincent P, Mundia-Howe M, Pekney NJ. “A National Estimate of Natural Gas Underground Storage Incident Emissions” Oral presentation at American Geophysical Union Conference. Dec. 1-17, 2020, San Francisco, CA

Pekney NJ, Reeder MD, Saint-Vincent P, Sams J, Mundia-Howe M, Li HZ, Gorantla VR, Bhandari G. “Quantifying Methane Emissions from Natural Gas Infrastructure” Poster presentation at Air & Waste Management Association’s 113<sup>th</sup> Annual Conference & Exhibition. June 29-July 2, 2020, San Francisco, CA

**Li HZ**, Mundia-Howe M, Reeder MD, Pekney NJ. “Gathering Pipeline Methane Emissions in Appalachian/San Juan/Piceance Basin using Unmanned Aerial Vehicle and Mobile Sampling” Poster presentation at American Geophysical Union Conference. Dec. 9-13, 2019, San Francisco, CA

Presto AA, Ye Q, **Li HZ**, Robinson ES, Gu P, Sullivan RC, Apte JS, Robinson AL, Donahue NM. “Exposure Beyond Mass: High-Spatial Resolution Exposure to Source-resolved Atmospheric Particle Number and Chemical Mixing State.” Poster presentation at the International Society of Environmental Epidemiology Conference. Aug. 25-28, 2019, Utrecht, The Netherlands

**Li HZ**, Mundia-Howe M, Pekney NJ. “Assessment of Gathering Natural Gas Pipeline in Ohio/New Mexico/Colorado.” Oral presentation in Natural Gas Infrastructure 2019-National Energy Technology Laboratory, Aug. 21, 2019, Pittsburgh, PA

**Li HZ**, Reeder MD, Litten J, Pekney NJ. “Identifying Under-characterized Atmospheric Methane Emission Sources in Western Maryland.” Poster presentation at 100<sup>th</sup> American Geophysical Union Conference. Dec. 10-14, 2018, Washington, DC

Ye Q, **Li HZ**, Gu P, Robinson ES, Sullivan RC, Apte JS, Robinson AL, Presto AA, Donahue NM. “Using an Advanced Single Particle Mass Spectrometer on a Mobile Platform to Study Spatial Variability of Population Exposure to Traffic and Cooking Particulate Matter in Pittsburgh, PA.” Platform presentation at 100<sup>th</sup> American Geophysical Union Conference. Dec. 10-14, 2018, Washington, DC

Zimmerman N, **Li HZ**, Ellis A, Hauryliuk A, Robinson RS, Gu P, Snell L, Subramanian R, Robinson AL, Apte JS, Presto AA. “Integrating Spatiotemporal Variability and Modifiable Factors into Air Pollution Estimates.” Platform presentation at Air Sensors International Conference. Sep. 12-14, 2018, Oakland, CA

**Li HZ**, Gu P, Ye Q, Zimmerman N, Subramanian R, Robinson ES, Apte JS, Robinson AL, Presto AA. “Neighborhood-scale Spatial Variability of PM Mass and Number and Exposure Misclassification in an Eastern US City.” Platform presentation at 10<sup>th</sup> International Aerosol Conference. Sep. 2-7, 2018, Saint Louis, MO

Gu P, **Li HZ**, Ye Q, Robinson ES, Apte JS, Robinson AL, Presto AA. “Spatially-Resolved Comparison of Traffic and Cooking-Related PM<sub>1</sub> Emission in Urban Area and Their Threat to Public Health.” Poster presentation at 10<sup>th</sup> International Aerosol Conference. Sep. 2-7, 2018, Saint Louis, MO

Presto AA, Robinson RS, Shah RU, Gu P, **Li HZ**, Apte JS, Robinson AL. “Long-Term Exposure to Ambient Air Pollution and Cognitive Function in Older U.S. Adults: The Multi-Ethnic Study of Atherosclerosis and Air Pollution.” Poster Presentation at the Joint Annual Meeting of the International Society of Exposure Science and the International Society for Environmental Epidemiology (ISES-ISEE 2018). Aug. 26-30, Ottawa, Canada

Zimmerman N, **Li HZ**, Ellis A, Hauryliuk A, Robinson RS, Gu P, Snell L, Subramanian R, Robinson AL, Apte JS, Presto AA. “Integrating Spatiotemporal Variability and Modifiable Factors into Air Pollution Estimates.” Poster presentation at the Joint Annual Meeting of the International Society of Exposure Science and the International Society for Environmental Epidemiology (ISES-ISEE 2018). Aug. 26-30, 2018, Ottawa, Canada

Presto AA, **Li HZ**, Robinson ES, Gu P, Saha P, Shah RU, Apte JS, Robinson AL. “Spatial Patterns of Exposures to Nontraditional Pollutants: Source Resolved Organic Aerosol and Ultrafine Particles.” Platform presentation at the Joint Annual Meeting of the International Society of Exposure Science and the International Society for Environmental Epidemiology (ISES-ISEE 2018). Aug. 26-30, 2018, Ottawa, Canada

Ye Q, Gu P, **Li HZ**, Robinson ES, Apte JS, Robinson AL, Presto AA, Sullivan RC, Donahue NM. “High Spatial Resolution of Atmospheric Mixing State and Its Links to Particle Evolution in a Metropolitan Area.” Poster presentation at American Geophysical Union Conference. Dec. 11-15, 2017, New Orleans, LA

**Li HZ**, Gu P, Ye Q, Zimmerman N, Subramanian R, Robinson ES, Apte JS, Robinson AL, Presto AA. “Interplay of Mobile Air Monitoring and Distributed Samplers to Study Intracity Spatiotemporal Variation.” Poster presentation at annual meeting of American Association for Aerosol Research. Oct. 16-20, 2017, Raleigh, NC

Ye Q, Gu P, **Li HZ**, Robinson ES, Apte JS, Robinson AL, Presto AA, Sullivan RC, Donahue NM. “High Spatial Resolution of Sources, Mixing State and Exposure of Particulate Matter Using Single Particle Mass Spectrometry.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 16-20, 2017, Raleigh, NC

Gu P, **Li HZ**, Ye Q, Robinson ES, Robinson AL, Presto AA. “Classification, Variation and Spatial Patterns of Mass Spectra Extracted from Plume Events Observed from Mobile Measurement by Aerodyne Aerosol Mass Spectrometer and Comparison with PMF Results.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 16-20, 2017, Raleigh, NC

Gu P, **Li HZ**, Ye Q, Robinson ES, Shah R, Shi J, Robinson AL, Presto AA. “Investigating Spatial Variation in Organic Aerosol Concentrations and Source Impact in a Metropolitan Area by Mobile Sampling with Aerodyne Aerosol Mass Spectrometer.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 16-20, 2017, Raleigh, NC

Ellis A, Zimmerman N, **Li HZ**, Gu P, Robinson ES, Robinson AL, Apte JS, Presto AA, Subramanian R. “High Temporal and Spatial Variability in Ambient Black Carbon in an Urban Area from Fixed-site and Mobile Monitoring.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 16-20, 2017, Raleigh, NC

Presto AA, Zimmerman N, Gu P, **Li HZ**, Subramanian R, Apte JS, Robinson AL. “Intra-urban Spatial and Temporal Variations in Fine Particle Composition, Number, and Sources.” Platform presentation at Air & Waste Management Association’s 110<sup>th</sup> Annual Conference & Exhibition. June 5-8, 2017, Pittsburgh, PA

Zimmerman N, Ellis A, Schurman MI, Gu P, **Li HZ**, Snell L, Gu J, Subramanian R, Robinson AL, Apte JS, Presto AA. “Characterizing Intra-Urban Air Quality Gradients with a Spatially-Distributed Network.” Poster presentation at annual meeting of American Geophysical Union. Dec. 12-16, 2016, San Francisco, CA

Gu P, **Li HZ**, Ye Q, Zimmerman N, Robinson AL, Presto AA. “Investigation of Organic Aerosol Concentration and Composition through a Mobile/Satellite Sites Sampling Platform.” Poster presentation at annual meeting of American Association for Aerosol Research. Oct. 18-21, 2016, Portland, OR

**Li HZ**, Dallmann TR, Gu P, Li X, Presto AA. “Spatial Variation of Organic Aerosol and Source Identification of Temperature-resolved Carbon Fractions.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 18-21, 2016, Portland, OR

**Li HZ**, Gu P, Ye Q, Zimmerman N, Subramanian R, Robinson ES, Apte JS, Robinson AL, Presto AA. “A Hybrid Sampling Network to Investigate Intracity Spatiotemporal Variation of Multiple Pollutants.” Poster presentation at annual meeting of American Association for Aerosol Research. Oct. 18-21, 2016, Portland, OR

Presto AA, Zimmerman N, **Li HZ**, Gu P, Subramanian R, Robinson AL, Apte JS. “Intra-urban Spatial and Temporal Variations in Fine Particle Number, Mass Concentration, and Size Distributions.” Oral presentation at annual meeting of American Association for Aerosol Research. Oct. 18-21, 2016, Portland, OR

**Li HZ**, Dallmann TR, Presto AA. “Spatial Variation of PM<sub>2.5</sub> Components with Mobile Sampling Strategy in Pittsburgh.” Poster presentation at annual meeting of American Association for Aerosol Research. Oct. 12-16, 2015, Minneapolis, MN

### **TEACHING EXPERIENCE**

**Fundamentals of Atmospheric Aerosols**, Carnegie Mellon University  
Teaching Assistant Pittsburgh, PA  
2018

**Thermal Fluids and Experimentation**, Carnegie Mellon University  
Teaching Assistant Pittsburgh, PA  
2016

**Thermal Fluids and Experimentation**, Carnegie Mellon University  
Teaching Assistant Pittsburgh, PA  
2015

### **LEADERSHIP**

**American Association for Aerosol Research Student Chapter** Pittsburgh, PA

President 2016

### **AWARDS and HONORS**

#### **Oak Ridge Institute for Science and Education (ORISE)**

**Postdoctoral Fellowship**, National Energy Technology Laboratory 2018  
**Graduate Student Assembly Travel Fund**, Carnegie Mellon University 2015 - 2017  
**Outstanding Graduate**, Wuhan University of Technology 2013  
**Outstanding Student Scholarship**, Wuhan University of Technology 2009 - 2012

### **MEDIA COVERAGE**

“Restaurants’ contribution to air pollution revealed,” *The Guardian*, Oct. 2019  
 “Reports giving Pittsburgh air a failing grade doesn’t tell the whole story, researchers say,” *NPR*, May 2019  
 “Restaurants spew out lots of aerosol pollution,” *Futurity*, Feb. 2019  
 “Eating out, breathing in,” *Carnegie Mellon University Press*, Jan. 2019  
 “Mobile source pollution – the biggest air pollution culprit may be all of us,” *Pittsburgh Quarterly*, Dec. 2018  
 “Study: restaurants are significant air pollution contributors,” *Engineering 360*, Nov. 2018  
 “Why the EPA wants data from Pittsburgh Rooftops,” *NPR*, Feb. 2017  
 “Explainer: what you should know about Pittsburgh’s air quality,” *PublicSource*, Dec. 2016  
 “What does Pittsburgh’s love of fireworks mean for air quality,” *The Incline*, Dec. 2016

### **PROFESSIONAL SOCIETY MEMBERSHIPS**

American Association for Aerosol Research (AAAR)  
 American Geophysical Union (AGU)  
 National Postdoctoral Association (NPA)

### **PROFESSIONAL SERVICES**

Editor: *Atmosphere* (2020-)

Peer reviewer for the following journals: *Environmental Science & Technology*, *Atmospheric Environment*, *Environmental Pollution*, *Science of the Total Environment*, *Atmosphere*, *Sustainability*, *International Journal of Environmental Research and Public Health*, *Sensors*, *Environments*, *PLOS One*, *Journal of Environmental Health Science and Engineering*

Student poster judge: AGU national meeting (2018, 2019)