

Minghao Qiu

Doerr School of Sustainability and Center for Innovation in Global Health, Stanford University

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EMPLOYMENT

Postdoctoral Fellow in Planetary Health and Human health, Department of Earth System Science and Center for Innovation in Global Health, Stanford University (Advisor: Marshall Burke) Oct 2022 - present
Postdoctoral Scholar, Department of Earth System Science, Stanford University Oct 2021 - Sep 2022

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA Sep 2016 - Sep 2021

Ph.D., Institute for Data, Systems, and Society (Focus: Environmental Science and Policy)

Thesis committee: Noelle E. Selin (advisor), Valerie J. Karplus, Corwin M. Zigler, Colette L. Heald

Thesis title: Impacts of Energy and Environmental Policies on Air Quality: Bridging Observational Data, Statistical, and Atmospheric Models

Selected PhD courses: Econometric; Statistical machine learning; Environmental modeling; Atmospheric chemistry; Microeconomics; Probability; Optimization.

Peking University, Beijing, China Sep 2012 - Aug 2016

B.S., Environmental Sciences, and B.A., Economics

RESEARCH EXPERIENCE

Stanford University, Stanford, CA Oct 2021 - present

- Evaluate effects of drought on energy systems, air quality, and human health.
- Climatic drivers and human impacts of wildfire PM_{2.5} pollution.

Massachusetts Institute of Technology, Cambridge, MA Sep 2016 - Sep 2021

- Evaluate the ability of statistical models to correct for meteorological variability when estimating trends in air quality; design a new machine learning approach that reduced estimation bias by 60% compared to widely-used regression methods.
- Estimate the effects of wind power on air quality, health, and environmental justice in the US with causal inference, GEOS-Chem and adjoint model.
- Examine the causal effects of China's energy and SO₂ policies on air quality and health at the firm-level.

International Institute for Applied Systems Analysis, Austria Jun 2019 - Sep 2019

Researcher, Young Scientists Summer Program (advisor: Jens Borken-Kleefeld)

- Develop the first statistical method to estimate average emission factors of diesel vehicles with instantaneous measurements from remote sensing.

University of California, Berkeley, Berkeley, CA Jun 2015 - Oct 2015

Visiting Student Researcher, Atmospheric Chemistry Group (advisor: Ronald Cohen)

PUBLICATIONS

Under review, submitted, in preparation

Maja Schlter, Christa Brelsford, Paul J Ferraro, Kirill Orach, **Minghao Qiu**, Martin D Smith. Unraveling complex causal processes that affect sustainability requires more integration between empirical and modeling approaches. (*submitted*)

Marshall Burke, Marissa L. Childs, Brandon de la Cuesta, **Minghao Qiu**, Jessica Li, Carlos F. Gould, Sam Heft-Neal, Michael Wara. Wildfire influence on recent US pollution trends. (*submitted*) [[Preprint](#)]

Haitong Zhe Sun et al. Antagonism between ambient ozone increasing and urbanisation-oriented population migration on Chinese cardiopulmonary mortality. (*submitted*)

Paul Picciano, **Minghao Qiu**, Sebastian Eastham, Mei Yuan, John Reilly, Noelle E. Selin. Air Quality-Related Equity Implications of U.S. Decarbonization Policy. (*submitted*) [[Preprint](#)]

Minghao Qiu, Jessica Li, Jeff Wen, Marissa Childs, Marshall Burke. Impacts of climate change on wildfire smoke exposure over the continental US at the census tract level. (*in preparation*) [[AGU abstract](#)]

Minghao Qiu, Makoto Kelp, Marshall Burke. How to estimate PM_{2.5} attributable to wildfire smoke: comparison between estimates from chemical transport models and satellite-derived machine learning methods. (*in preparation*)

Peer Reviewed

* denotes equal contribution

8. **Minghao Qiu**, Nathan Ratledge, Ines Azevedo, Noah Diffenbaugh, Marshall Burke. (2023). Drought impacts on the electricity system, emissions, and air quality in the western US. *Proceedings of the National Academy of Sciences*, 120(28), e2300395120. [[Link](#)]

Press coverage: [Stanford News](#), [the Hill](#), [AGU Eos](#), [The Seattle Times New Scientist](#)

7. **Minghao Qiu**, Cory Zigler, Noelle Selin. (2022). Impacts of wind power on air quality, premature mortality and exposure disparities in the US. *Science Advances*, 8(48), eabn8762 [[Link](#)]

Press coverage: [MIT News](#), [US News & World Report](#), [HealthDay](#), [The Verge](#)

6. Marissa Childs, Jessica Li, Jeff Wen, Anne Driscoll, Sherrie Wang, Carlos Gould, **Minghao Qiu**, Jen Burney & Marshall Burke. (2022). Daily local-level estimates of ambient wildfire smoke PM_{2.5} for the contiguous US. *Environmental Science and Technology*, 56(19), 13607-13621 [[Link](#)]

Press coverage: [NYTimes](#), [Guardian](#), [SFChronicle](#)

5. **Minghao Qiu**, Cory Zigler, Noelle Selin. (2022). Statistical and machine learning methods for evaluating trends in air quality under changing meteorological conditions. *Atmospheric Chemistry and Physics*, 22(16), 10551-10566 [[Link](#)]

4. **Minghao Qiu**, Jens Borken-Kleefeld. (2022). Using snapshot measurements to identify high-emitting vehicles. *Environmental Research Letters*, 17(4), 044045 [[Link](#)]

3. **Minghao Qiu***, Yangqin Weng*, Jing Cao, Noelle Selin, Valerie Karplus. (2020). Improving evaluation of energy policies with multiple goals: Comparing *ex ante* and *ex post* approaches *Environmental Science and Technology*, 54(24), 15584-15593 [\[Link\]](#)
2. Haozhe Yang, Wei Tao, Ying Liu, **Minghao Qiu**, Junfeng Liu, Kejun Jiang, Kan Yi, Yao Xiao, Shu Tao. (2018). The contribution of the Beijing, Tianjin and Hebei region's iron and steel industry to local air pollution in winter. *Environmental Pollution*, 245, 1095-1106 [\[Link\]](#)
1. Kai Wei, **Minghao Qiu**, Rongfei Zhang, Liantong Zhou, Ting Zhang, Maosheng Yao, and Chunxiong Luo. (2017). Single Living yEast PM Toxicity Sensor (SLEPTor) System. *Journal of Aerosol Science*, 107, 65-732 [\[Link\]](#)

GRANTS AND AWARDS

Atmospheric Chemistry Colloquium for Emerging Senior Scientists (ACCESSS XVII)	2023
Planetary Health Fellowship, Stanford and London School of Hygiene & Tropical Medicine (\$150,000)	2022
Outstanding Student Presentation Awards (OSPA), American Geophysical Union Fall Meeting	2021
MIT Martin Family Society of Fellows for Sustainability (\$50,000)	2020
Young Scientists Summer Program at IIASA (€3,000)	2019
MISTI Global Research Summer Fund (\$3,100)	2019
National Merit Scholarship, Ministry of Education, China	2014 - 2015

CONFERENCE AND SEMINAR PRESENTATIONS

13. Impacts of historical and future drought on the energy system and air quality in the western US. *AGU Fall Meeting*, oral presentation, 2022
12. Impacts of climate change on wildfire smoke exposure over the continental US at the census tract level. *AGU Fall Meeting*, poster presentation, 2022
11. Statistical and machine learning methods for evaluating trends in air quality under changing meteorological conditions. *AGU Atmospheric Science Section Early Career Seminar*, invited speaker, 2022
10. Challenges and opportunity in managing air pollution under a changing climate. *Peking University*, invited speaker, 2022
9. Impacts of energy and environmental policy on air quality: empirical data, statistical models, and atmospheric models. *Tsinghua University*, invited speaker, 2022
8. Statistical and machine learning methods for evaluating emissions reduction policies under changing meteorological conditions. *AGU Fall Meeting*, invited speaker, 2021
7. Assessing impacts of energy and environmental policies on air quality in the real world. *Brandeis University*, invited speaker, 2021
6. Impacts of energy and environmental policies on air quality in the real world. *MIT Joint Program on the Science and Policy of Global Change*, invited speaker, 2021
5. Statistical and machine learning methods for evaluating emissions reduction policies under changing meteorological conditions. *AGU Fall Meeting*, 2020
4. Evaluating quantitative techniques to assess policy impacts on air quality in changing meteorological conditions. *1st GEOS-Chem Europe Meeting*, 2020
3. Effectiveness of renewable energy policy for air pollution reductions: evidence from wind power in the US. *American Meteorological Society Annual Meeting*, Boston, 2020

2. Effectiveness of US state level climate policies: Evidence from plant level data in power sector. *Harvard/MIT ACE Center Science Advisory Committee Meeting*, Boston, 2018
1. Air Quality Co-benefits of Energy Policy: Evidence from industrial firms in China. *AGU Fall Meeting*, New Orleans, poster presentation, 2017

TEACHING AND MENTORING

Course contributor, MIT 6.419x *Data Analysis: Statistical Modeling and Computation in Applications* 2021
Lecturer, Public lecture on *Tools to reach climate targets*, Science in the News Network 2021
Lecturer, Public course on *Climate Change Policy 101*. MIT Joint Program on the Science and Policy of Global Change. 2017

Mentoring: summer research (1 undergrad), graduate school application assistance program (5 undergrads)

SERVICE AND PROFESSIONAL DEVELOPMENT

Session chair and organizer: American Geophysical Union Fall Meeting, 2021

Journal and conference referee: *ACS Environmental Au*, *Environmental Development and Sustainability*, *Environmental Health Perspectives*, *Environmental Pollution*, *Environmental Research Letters*, *Environmental Research: Health*, *Environmental Research Communications*, *Environmental Science and Technology*, *Geohhealth*, *Nature Communication*, *PNAS*, *Science Advances*, *Science of the Total Environment*, *NeurIPS*. 14 journals, 22 times.

MIT Social and Engineering Systems Doctoral Seminar, Coordinator 2019 - 2020

MIT Energy for Human Development, Co-President 2017 - 2019

PROFESSIONAL EXPERIENCE

World Resource Institute, Research Analyst, Beijing, China January 2016 - July 2016

Analyzed China's decarbonization strategy under Paris Agreement for energy supply, building, industry and transportation sectors; Drafted research report "China's CO₂ Emissions Pathways and Reduction Strategies under Paris Agreement".

TECHNICAL EXPERTISE

Atmospheric modeling: GEOS-Chem, Community Earth System Model (CESM)

Statistical causal inference, Machine learning

Coding and software: R, Python, Matlab, STATA, ArcGIS

REFERENCES

Noelle Selin

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Massachusetts Institute of Technology
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Valerie Karplus

Department of Engineering and Public Policy
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Jens Borken-Kleefeld

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