YIXIN GUO

Assistant Professor, Earth, Ocean and Atmospheric Sciences Thrust, HKUST (GZ)
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RESEARCH INTERESTS

The nitrogen cycle and atmospheric environment
Sustainable food systems
Climate mitigation and adaptation of agriculture

WORK EXPERIENCES

Tenure-track Assistant Professor at EOAS Thurst of HKUST (GZ) *Mar. 2024 - present*
Postdoctoral Researcher at Peking University *May 2023 - Feb. 2024*
Advisor: *Lin Zhang*
Postdoctoral Researcher jointed between Peking University and International Institute for Applied Systems Analysis (IIASA) *Oct 2020 - Apr. 2023*
Advisors: *Lin Zhang, Wilfried Winiwarter and Petr Havlik*
Postgraduate Research Associate at Princeton School of International and Public Affairs, Princeton University *Dec. 2019 - Aug. 2020*
Short-term consultant at the World Bank *July-Oct. 2017*

EDUCATION

M.A. and Ph.D. in Public Affairs and Environmental Studies at Princeton School of International and Public Affairs, Princeton University *2014 - 2019*
Advisor: *Denise L. Mauzerall*
Dissertation: *Mitigating Environmental and Health Damages: Opportunities From Changes in Agricultural Production and Food Consumption Practices in China*
B.S. in Atmospheric and Oceanic Sciences at School of Physics, Peking University *2010 - 2014*
Advisor: *Junfeng Liu*
Dissertation: *Quantifying trans-Pacific transport of tropospheric ozone pollution using sensitivity, tagged-NOy and fully-tagged methods*

PUBLICATIONS (*DENOTES CORRESPONDING AUTHOR)

1.**Guo Y.**, Zhao H., Winiwarter W. *et al.* Aspirational Nitrogen Interventions Accelerate Air Pollution Abatement and Ecosystem Protection, ***Science Advances*** , https://doi.org/10.1126/sciadv.ado0112. (2024)
2.**Guo Y.**, Zhang L., Winiwarter W. *et al.* Ambitious nitrogen abatement is required to mitigate future global PM2.5 air pollution towards the World Health Organization air quality targets, ***One Earth in press*** , (2024)
3. **Guo Y**, Tan H, Zhang L, *et al.* Global Food loss and waste embodies unrecognized harms to global air quality and biodiversity hotspots, ***Nature Food (IF 20.43)*** (2023), https://doi.org/10.1038/s43016-023-00810-0
4. J Xu, M Lu, **Guo Y***, L Zhang*, *et al* Summertime urban ammonia emissions may be substantially underestimated in Beijing, China ***Environmental Science and Technology (IF 11.357)***, (2023), https://doi.org/10.1021/acs.est.3c05266
5. **Guo Y**, He P, Searchinger, T.D., *et al.* Environmental and human health trade-offs in potential

Chinese dietary shifts, ***One Earth (IF 14.944)*** (2022), https:// doi.org/10.1016/j.oneear.2022.02.002

6. **Guo Y**, Chen, Y., Searchinger, T.D. *et al.* Air quality, nitrogen use efficiency and food security in China are improved by cost-effective agricultural nitrogen management. ***Nature Food (IF 20.43)*** 1, 648–658 (2020). https://doi.org/10.1038/s43016-020-00162-z **(ESI hot, highly sited and top paper)**

7. **Guo Y**, Liu J, Mauzerall D L, *et al.* Long-lived Species Enhance Summertime Attribution of North America Ozone to Upwind Sources, ***Environmental Science and Technology (IF 11.357)***, (2017) 51 (9), 5017-5025 DOI: 10.1021/acs.est.6b05664

8. Ma R, Zhang B, **Guo Y**, *et al* . Mitigation potential of global ammonia emissions and related health impacts in the trade network. ***Nature Communications (IF 17.694)*** 12, 6308 (2021). https://doi.org/10.1038/s41467-021-25854-3

9. Liu Z, Ying H, Chen M, Bai J, Xue Y, Yin Y, Batchelor W, Du M, **Guo Y**, *et al.* Optimization of China' s maize and soy production can ensure feed sufficiency at lower nitrogen and carbon footprints, ***Nature Food (IF 20.43)*** 2, 426–433 (2021). https://doi.org/10.1038/s43016-021-00300-1

10. Chen Y, Zhang L, Henze D, Zhao Y, Lu X, Winiwarter W, **Guo Y**, *et al*, Inter-annual variation of reactive nitrogen emissions and their impacts on PM2.5 air pollution in China during 2005-2015, (2021), ***Environmental Research Letters (IF 6.947)*** https://doi.org/10.1088/1748-9326/ac3695

11. Liu L, Xu W, Lu X, Zhong B, **Guo Y** *et al.* Exploring global changes in agricultural ammonia emissions and their contribution to nitrogen deposition since 1980 ***Proc. Natl. Acad. Sci. (IF 12.777)***, (2022),119 (14) e2121998119, https://doi.org/10.1073/pnas.2121998119

12. Wen Xu, Yuanhong Zhao, Zhang Wen, Yunhua Chang, Yuepeng Pan, Yele Sun, Xin Ma, Zhipeng Sha, Ziyue Li, Jiahui Kang, Lei Liu, Aohan Tang, Kai Wang, Ying Zhang, **Yixin Guo**, *et al.* Increasing importance of ammonia emission abatement in PM2.5 pollution control, (2022), ***Science Bulletin (IF 20.577)*** DOI: 10.1016/j.scib.2022.07.021

13. Liu L, et al. Modeling global oceanic nitrogen deposition from food systems and its mitigation potential by reducing overuse of fertilizers ***Proc. Natl. Acad. Sci. (IF 12.777)***, 120.17 (2023): e2221459120.

14. Liu Z., Rieder H., Schmidt C., Mayer M., **Guo Y.**, *et al.* Optimal reactive nitrogen control pathways identified for cost-effective PM2.5 mitigation in Europe (2023) ***Nature Communications*** https://doi.org/10.1038/s41467-023-39900-9

15. Pan D., Mauzerall D., Wang R., Guo X., Puchalski M., **Guo Y.**, *et al.* Regime shift in secondary inorganic aerosol formation and nitrogen deposition in the rural United States. Nat. Geosci. (2024). https://doi.org/10.1038/s41561-024-01455-9

WORKING MANUSCRIPTS

1. **Guo Y**, Zhao H, Zhang L, Chang J, *et al.* Climate and air quality implications of future food trade (2024) ***in preparation***

ORAL PRESENTATIONS

Nitrogen shares in air pollution and scope of feasible interventions at the 21th annual meeting of AOGS (Asia Oceania Geoscience Society) (Korea) *June 2024*

Nitrogen abatement opportunities for improving air quality and ecosystem health at the 7th International Workshop on Regional Air Quality Management in Rapidly Developing Economic Regions (7RAQM) (Guangzhou) *May 2024*

A nitrogen perspective for addressing air pollution and beyond at the Nature Conference on Air Pollution and Climate Change (Beijing) *May 2024*

(Invited) *Overlooked Opportunities of Nitrogen Abatement For Improving Near-term Global Air Quality, Human and Ecosystem Health* at the American Geophysical Union Annual Meeting (San Francisco) *Dec 2023*

(Invited) *Mitigating Reactive Nitrogen and Associated Environmental Damages Through Transforming Our Food Systems* at ReCLEAN seminar series (jointed between ETH, EPFL, PSI, WSL and EAWAG Zurich) (online) *Oct 2023*

(Invited) *Mitigating Reactive Nitrogen pollution: present and future perspectives* at the Earth, Oceanic and Atmospheric Sciences (EOAS) Thrust of HongKong University of Science and Technology (Guangzhou) *Sep 2023*

(Invited) *Mitigating Reactive Nitrogen Loss and Associated Environmental Damages: Opportunities from Changes in Food Production, Consumption and Supply Chains* at the 20th annual meeting of AOGS (Asia Oceania Geoscience Society) (Singapore) *Aug 2023*

Food system strategies and their benefits for air quality, climate and ecosystems at the 4th Biogeochemical Nitrogen Cycle Forum (Beijing) *2023*

Environmental and Health Co-benefits of Sustainable Food System Strategies at American Geophysical Union Annual Meeting (San Francisco and online) *2022*

Mitigating Reactive Nitrogen Losses and Associated Environmental Damages in China at the 8th Global Nitrogen Conference (Berlin and online) *2021*

(Invited) *Implications of improving food production and consumption for ammonia emissions and air pollution* at the Center for Agricultural Resources Research in the Chinese Academy of Sciences, Shijiazhuang, China *2021*

(Invited) *Ammonia Emissions and Air Quality Under Various Chinese Diets* at the 25th Annual Meeting For Atmospheric Pollution Management and Controls at Xi'an, China *2021*

(Invited) *Effects of cost-effective agricultural nitrogen management on air quality and food security* at the College of Resources and Environmental Sciences of China Agriculture University (online) *2021*

(Invited) *Ammonia Emission Mitigation Strategies and Consequent Environmental Effects in China* at the 2nd Sino-Korean Air Quality Forum (online) *2020*

(Invited) *Air Quality, Nitrogen Use Efficiency And Food Security in China Are Improved by Cost-effective Agricultural Nitrogen Management* at China Agriculture University (online) *2020*

(Invited) *Agricultural Production and Consumption Strategies in China: Benefits for Air Quality, Nitrogen Use Efficiency, Climate and Dietary Health* at Atmospheric and Oceanic Science Seminar series at Peking University, Beijing, China *2019*

Mitigating Reactive Nitrogen Loss and Associated Environmental Damages: Opportunities from Changes in Production and Consumption in China at American Geophysical Union Annual Meeting, San Francisco, CA *2019*

Effectiveness of Agricultural Ammonia Control Strategies for Mitigating PM2.5 Pollution in China at Ammonia Workshop hosted by the Environment and Climate Change Agency of the Canadian government, Ottawa, Canada *2018*

(Invited)*Reducing Nitrogen Pollution from Crop Fertilizer Use and Manure Management* at Atmospheric Science Seminar of Cornell University, Ithaca, NY *2017*

Long-lived Species Enhance Summertime Attribution of North America Ozone to Upwind Sources at American Geophysical Union Annual Meeting, San Francisco, CA *2016*

POSTER PRESENTATIONS AND CONFERENCES

Poster entitled 'Environmental and Health Co-benefits of Sustainable Food System Strategies in China' for Asian Conference on Meteorology (online) *2022*

"Developing roadmaps for sustainable nitrogen management", Paris, France (online and in-person) *2022*

The 3rd young scholar forum on 'Biogeochemical cycle of nitrogen (International Nitrogen Initiative-China)', Shanghai, China *2021*

American Geophysical Union Annual Meeting, San Francisco, CA *2019*

Third Plenary Meeting of International Nitrogen Management System, Edinburgh, Scotland *2018*

High-yield High-efficiency Agriculture Conference, Kunming, China *2017*

American Geophysical Union Annual Meeting, San Francisco, CA *2016*

Chinese Environmental Scholars Forum, Princeton, NJ *2016*

Community Earth System Model Annual workshop, Breckenridge, CO *2016*
Poster at Princeton E-ffiliates Partnership second annual Retreat, Princeton, NJ *2015*
Poster at American Geophysical Union Annual Meeting, San Francisco, CA *2014*

PROFESSIONAL EXPERIENCES

Visiting student at Prof. Lin Zhang's group at Peking University, Beijing, China *summer 2018 and winter 2019*
Visiting student at Prof. Peter Hess's group at Cornell University, Ithaca NY *Nov 2017*
Visiting student at Prof. Fusuo Zhang's group at China Agricultural University, Beijing, China *summer 2017*
Volunteer for The Nature Conservancy Beijing office in support of the climate change mitigation and agriculture pollution management projects, Beijing, China *2013-2014*

TEACHING

Assistant instructor for *The Environment: Science and Policy (WWS/ENV350)* *Spring 2018 and Spring 2019*

SKILLS

Atmospheric Chemistry Transport Model: *WRF-Chem*, *GEOS-Chem* and *MOZART-4*
Earth System Model: *NCAR CESM (Community Earth System Model)*
Economic model: *IIASA GLOBIOM (Global Biosphere Management Model)*
Integrated assessment model: *IIASA GAINS (Greenhouse Gas - Air Pollution Interactions and Synergies) model*
Scenario and Policy Analysis, Qualitative Research Methods
Skilled at Linux, Fortran, NCL, Office, Python, C++, *Algorithms and Data Structure*), MATLAB, Gnuplot, GAMS

GRANTS AND FELLOWSHIPS

Guangzhou - HKUST (GZ) joint research funding (rmb 250000), reactive nitrogen emission reduction potentials and benefits for global air pollution management, PI, 2025-2027
Guangzhou Municiple Bureau of Science and Technology Qihang research funding (rmb 50000), ammonia emissions in global trade networks and their contribution to global PM2.5 pollution: past and future evolvements, PI, 2025-2027
Chinese Postdoc Special Support Scientific Grant (rmb 180,000; 2022T150005), China Postdoctoral Science Foundation *2022*
International Fellowship for Postdoc Researchers (rmb 600,000), China Postdoctoral Science Foundation *2021*
PKU (Peking University)- IIASA (International Institute for Applied Systems Analysis) postdoctoral fellowship *2020-2022*
Graduate School Dean's Completion Fellowship, Princeton University *2019-2020*
Princeton Institute for International and Regional Studies Graduate Funding, Princeton University *2018*
Princeton School of International and Public Affairs Graduate Fellowship, Princeton University *2014-2019*

AWARDS

"Agricultural ammonia mitigation potentials and benefits for PM2.5 air pollution mitigation" selected for the 2023 Top 10 Scientific Achievements in Biogeochemical Nitrogen Cycles by the Nitrogen Working Group of Soil Science Society of China *2024*
"Ammonia mitigation opportunities in international trade network" selected for the 2021 Top 10 Scientific Achievements in Biogeochemical Nitrogen Cycles by the Nitrogen Working Group of Soil Science Society of China *2023*
Green Talent (25 outstanding young scientists selected globally), German Federal Ministry of Education and Research *2022*
Award for excellent undergraduate research by Bases for Cultivation of Talents of Geophysical Sciences, Peking University *2013*
Samsung Scholarship, for top 3% physics-major students, Peking University *2012-2013*
Merit Student, Peking University *2012-2013*
Meritorious winner for Mathematical Contest in Modeling (MCM) *2013*
1st Prize of National Olympiad in Chemistry in Provinces, China Chemistry Federation *2009*

REVIEW ACTIVITIES

Reviewer for *Nature Climate Change, Nature Food, Nature Sustainability, One Earth, PNAS, Environmental Research Letters, and Atmospheric Chemistry and Physics*
2022 IOP Trusted Reviewer Award
2023 IOP Outstanding Reviewer Award

REFERENCES

Denise L. Mauzerall (mauzeral@princeton.edu) (PhD advisor)
Princeton School of Public and International Affairs and Department of Civil and Environmental Engineering, Princeton University
Timothy D. Searchinger (tsearchi@princeton.edu) (PhD co-advisor)
Princeton School of Public and International Affairs, Princeton University
Lin Zhang (zhanglg@pku.edu.cn) (PhD co-advisor and postdoc advisor)
Department of Atmospheric and Oceanic Sciences at School of Physics, Peking University
Wilfried Winiwarter (winiwart@iiasa.ac.at) (postdoc advisor)
Energy, Climate, and Environment (ECE), International Institute for Applied Systems Analysis
Junfeng Liu (jfliu@pku.edu.cn) (undergraduate advisor)
College of Urban and Environmental Sciences, Peking University

COLLABORATIONS

Princeton University, Oxford University, Cornell University, Finnish Meteorological Institute,
International Institute for Applied Systems Analysis (IIASA), Geophysical Fluid Dynamics Laboratory,
China Agricultural University, Tsinghua University,
Zhejiang University, Peking University, Netherlands Environmental Agency