

MUYE RU, PhD

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Expertise: scenario analysis with integrated assessment models and Earth system models in finance; energy system modeling and emission inventories; health and economic impacts of air pollution and climate change; empirical assessment of policy impacts using satellite data;

ACADEMIC PROFESSIONAL EXPERIENCE

DIRECTOR, March 2022 - present
Global Sustainable Finance, Morgan Stanley, NY, USA

CONSULTANT, July 2021 - present
International Institute for Applied Systems Analysis, Laxenburg, Austria

- ◆ *Incorporate self-derived concentration-response functions on morbidity effects of air pollution into the GAINS model, and accomplish policy analysis of a variety of emission reduction scenarios in Asian.*

POSTDOCTORAL RESEARCH FELLOW, October 2020 - March 2022
The Earth Institute, Columbia University, NY, USA

Ongoing projects:

- ◆ *Empirical evaluation of policies related to climate change and air pollution using satellite retrievals.*
- ◆ *Use Earth system model simulation results to study impacts of climate and air quality policies.*
- ◆ *Quantification of uncertainty in impact assessment of climate change and air pollution.*

Advisors: Wolfram Schlenker, Arlene Fiore

CONSULTANT, November 2021 – March 2022
International Institute for Applied Systems Analysis, Laxenburg, Austria

- ◆ *Incorporate self-derived concentration-response functions on morbidity effects of air pollution into the GAINS model, and accomplish policy analysis of a variety of emission reduction scenarios in Asian.*

EDUCATION

Duke University, Durham, NC, USA September 2014 – September 2020

PHD IN EARTH AND OCEAN SCIENCE, Sep 2020

Dissertation: The atmosphere, health, and the economy: understanding and modeling their interactions.

Advisor: Drew Shindell

MASTER OF ENERGY MANAGEMENT, May 2016

Nicholas School of the Environment

Peking University, Beijing, China September 2009 – June 2013

BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE, June 2013

BACHELOR OF ART IN ECONOMICS, June 2013

SKILLS

Physical modeling of climate change:

- ◆ **Earth system modeling:** CESM
- ◆ **Climate simulation data:** CMIP6

Economic modeling:

- ◆ **Integrated assessment models:** GAINS, GCAM, International Futures
- ◆ **Econometric:** panel data, time-series analysis, convergence theory, causal inference.

Statistics: non-linear fitting, extreme events statistics, Monte Carlo method, spatiotemporal analysis.

Programming and software: Python, R, Linux, Stata, Matlab.

SELECTED AWARDS

THE EARTH INSTITUTE RESEARCH FELLOWSHIP

The Earth Institute, Columbia University, NY, USA

2020

GRADUATE FELLOWSHIP 2019
The Kenan Institute for Ethics, Duke University, NC, USA

YOUNG SCIENTIST SUMMER PROGRAM FELLOWSHIP 2019
International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria

GLOBAL SCHOLARSHIP FOR SUSTAINABLE ENERGY DEVELOPMENT 2014 – 2016
Global Sustainable Electricity Partnership, Montréal, Canada

THE SUMMIT RESEARCH FELLOW September 2013 – July 2014
College of Urban and Environmental Sciences, Peking University, Beijing, China

PROFESSIONAL EXPERIENCE AND SERVICE

SUMMER RESEARCH SCIENTIST (YSSP) June - August 2019
International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria
Developed damage functions for various morbidity impacts from climate change and air pollution. Built these functions into GAINS, an integrated assessment model based in Python and SQL.

CO-DIRECTOR August 2017 – August 2019
Global Energy Access Network, Duke University, NC, USA
Initiated the school-wide network for interdisciplinary discussions and activities for energy access issues.

ENERGY ANALYST INTERN May 2015 – August 2015
Union of Concerned Scientists, Cambridge, MA, United States
Contributed to producing and delivering the online report *Rating the States on Their Risk of Natural Gas Overreliance* through quantitatively and qualitatively analysis of historical and projected energy data.

SUSTAINABLE CITY INTERN March 2014 – May 2014
National Resources Defense Council, Beijing, China
Completed the Walkability Evaluation of Chinese Cities by setting up a walkability index system.

ENERGY RESEARCH FELLOW September 2013 – July 2014
Peking University, Beijing, China
Designing and leading a nationwide survey on rural energy use by collecting 50,000 questionnaires in every province in China. Using the results to characterize energy transition in rural China over 30 years.

SELECTED PUBLICATIONS

Ru, M., Shindell, D., Spadaro, J., Challapalli, A., Lamarque, J-F., Wagner, F., Kieseewetter, G.. New damage functions for six morbidity endpoints associated with short-term aerosol exposure (*under review, Environmental Health Perspectives*).

Buchholz, R., Park, M., Worden, H., Tang, W., Edwards, D., Gaubert, B., Deeter, M., Sullivan, T., **Ru, M.**, Chin, M., Levy, R., Zheng, B., Magzamen, S. New seasonal pattern of pollution emerges from changing North American wildfires. *Nature communications*, 13(1), pp.1-9.

Shindell, D., **Ru, M.**, Zhang, Y., Seltzer, K., Faluvegi, G., Nazarenko, L., Schmidt, G.A., Parsons, L., Challapalli, A., Yang, L. and Glick, A., 2021. Temporal and spatial distribution of health, labor, and crop benefits of climate change mitigation in the United States. *Proceedings of the National Academy of Sciences*, 118(46).

One of the main authors of United Nations Environment Programme and Climate and Clean Air Coalition (2021). Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions. Nairobi: *United Nations Environment Programme*.

Ru, M., Brauer, M., Lamarque, J-F., Shindell, D.. Exploration of the global burden of dementia attributable to PM_{2.5}: what do we know based on current evidence? *GeoHealth*, p.e2020GH000356.

Miyazaki, K., Bowman, K., Sekiya, T., Jiang, Z., Chen, X., Eskes, H., **Ru, M.**, Zhang, Y. and Shindell, D., 2020. Air Quality Response in China Linked to the 2019 Novel Coronavirus (COVID - 19) Lockdown. *Geophysical Research Letters*, 47(19), p.e2020GL089252.

- Shindell, D., Zhang, Y., Scott, M., **Ru, M.**, Stark, K. and Ebi, K.L., 2020. The effects of heat exposure on human mortality throughout the United States. *Geohealth*, 4(4), p.e2019GH000234.
- Shen, G., **Ru, M.**, Du, W., Zhu, X., Zhong, Q., Chen, Y., Shen, H., Yun, X., Meng, W., Liu, J., Cheng, H., Hu, J., Guan, D., Tao, S., (2019) Impacts of Air Pollutants from Rural Chinese Households under the Rapid Residential Energy Transition. *Nature Communications*, 10(1), pp.1-8.
- Ru, M.**, Shindell, D., Seltzer, K., Tao, S., Zhong, Q., (2018). The long-term relationship between emissions and economic growth for SO₂, CO₂, and BC. *Environmental Research Letters*, 13(12), 124021.
- Du, W., Cohen, A., Shen, G., **Ru, M.**, Shen, H., & Tao, S., (2018). Fuel use trends for boiling water in rural China (1992-2012) and environmental health implications: A national cross-sectional study. *Environmental Science & Technology*, 52(21), 12886-12894.
- Tao, S., **Ru, M.**, Du, W., Zhu, X., Zhong, Q., Li, B., Shen, G., Pan, X., Meng, W., Chen, Y., Shen, H., Lin, N., Su, S., Zhuo, S., Huang, T., Xu, Y., Yun, X., Liu, J., Wang, X., Liu, W., Cheng, H., Zhu, D., (2018). Quantifying the rural residential energy transition in China from 1992 to 2012 through a representative national survey. *Nature Energy*, 3(7), 567.
- Shen, H., Chen, Y., Russell, A. G., Hu, Y., Shen, G., Yu, H., Henneman, L., **Ru, M.**, Chen, Y., (2018). Impacts of rural worker migration on ambient air quality and health in China: From the perspective of upgrading residential energy consumption. *Environment International*, 113, 290-299.
- Shen, H., Tao, S., Chen, Y., Ciais, P., Güneralp, B., **Ru, M.**, Zhong, Q., Yun, X., Zhu, X., Huang, T. and Tao, W., (2017). Urbanization-induced population migration has reduced ambient PM_{2.5} concentrations in China. *Science Advances*, 3(7), p.e1700300.
- Ru, M.**; Tao, S.; Smith, K. R.; Shen, G.; Shen, H.; Huang, Y.; Chen, H.; Chen, Y.; Chen, X.; Liu, J., (2015). Direct energy consumption associated emissions by rural-to-urban migrants in Beijing. *Environmental Science & Technology*, 49(22), 13708-13715..
- Chen, H.; Huang, Y.; Shen, H.; Chen, Y.; **Ru, M.**; Chen, Y.; Lin, N.; Su, S.; Zhuo, S.; Zhong, Q., 2015. Modeling temporal variations in global residential energy consumption and pollutant emissions. *Applied Energy*, 184, 820-829..