



# Environmental Engineering & Sciences

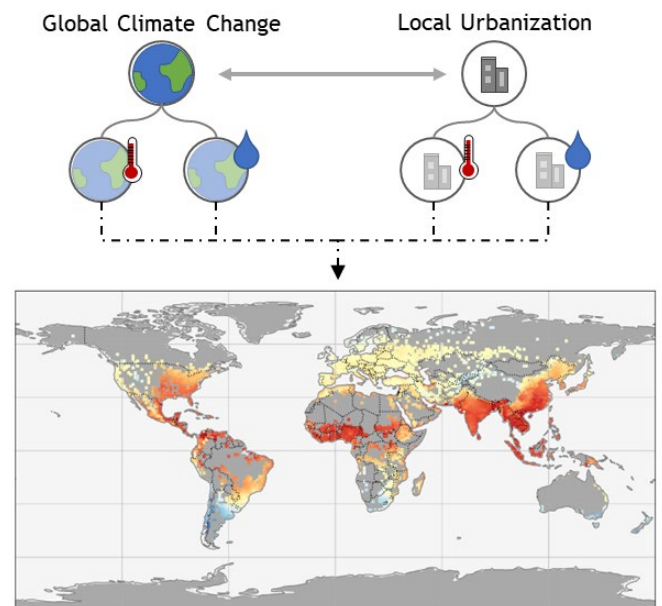
Department of Civil and Environmental Engineering  
CEE 595AG Seminar

Friday, March 3, 2023 | 10:00 – 10:50 a.m. CST | 3310 Newmark Lab

## Large Humidity Effects on Urban Heat Exposure and Cooling Challenges Under Climate Change

Many urban climates are characterized by increased temperature and decreased relative humidity, under climate change and compared to surrounding rural landscapes. The two trends have contrasting effects on human-perceived heat stress. However, their combined impact on urban humid heat and adaptation has remained largely unclear. Here, we use simulations from an earth system model to investigate how urbanization coupled with climate change affects urban humid heat stress, exposure, and adaptation.

Our results show that urban humid heat will increase substantially across the globe by 3.1 °C by the end of the century under a high emission scenario. This projected trend is largely attributed to climate change-driven increases in specific humidity (1.8 °C), followed by air temperature (1.4 °C) – with urbanization impacts varying by location and of a smaller magnitude. Urban humid heat stress is projected to be concentrated in coastal, equatorial areas. At least 44% of the projected urban population in 2100, the equivalent of over 3 billion people worldwide, is projected to be living in an urban area with high humid heat stress. We show a critical, climate-driven dilemma between cooling efficacy and water limitation of urban greenery-based heat adaptation. Insights from our study emphasize the importance of using urban-explicit humid heat measures for more accurate assessments of urban heat exposure and invite careful evaluation of the feasibility of green infrastructure as a long-term cooling strategy.



Future Urban Humid Heat Exposure and Cooling



### Joyce Yang | Advisor Prof. Lei Zhao

Joyce is a 2nd year PhD student working with Dr. Lei Zhao. She received her B.S. in Civil Engineering from the University of Maryland, College Park, and her M.S. in Civil Engineering here at UIUC, also advised by Dr. Lei Zhao. Her research interests include urban humid heat stress under climate change, vulnerability of interconnected urban infrastructure networks to climate change, and climate-conscious urban knowledge transfer. Broadly, her goal is to study the impacts of climate change on urban citizens and civil infrastructure.