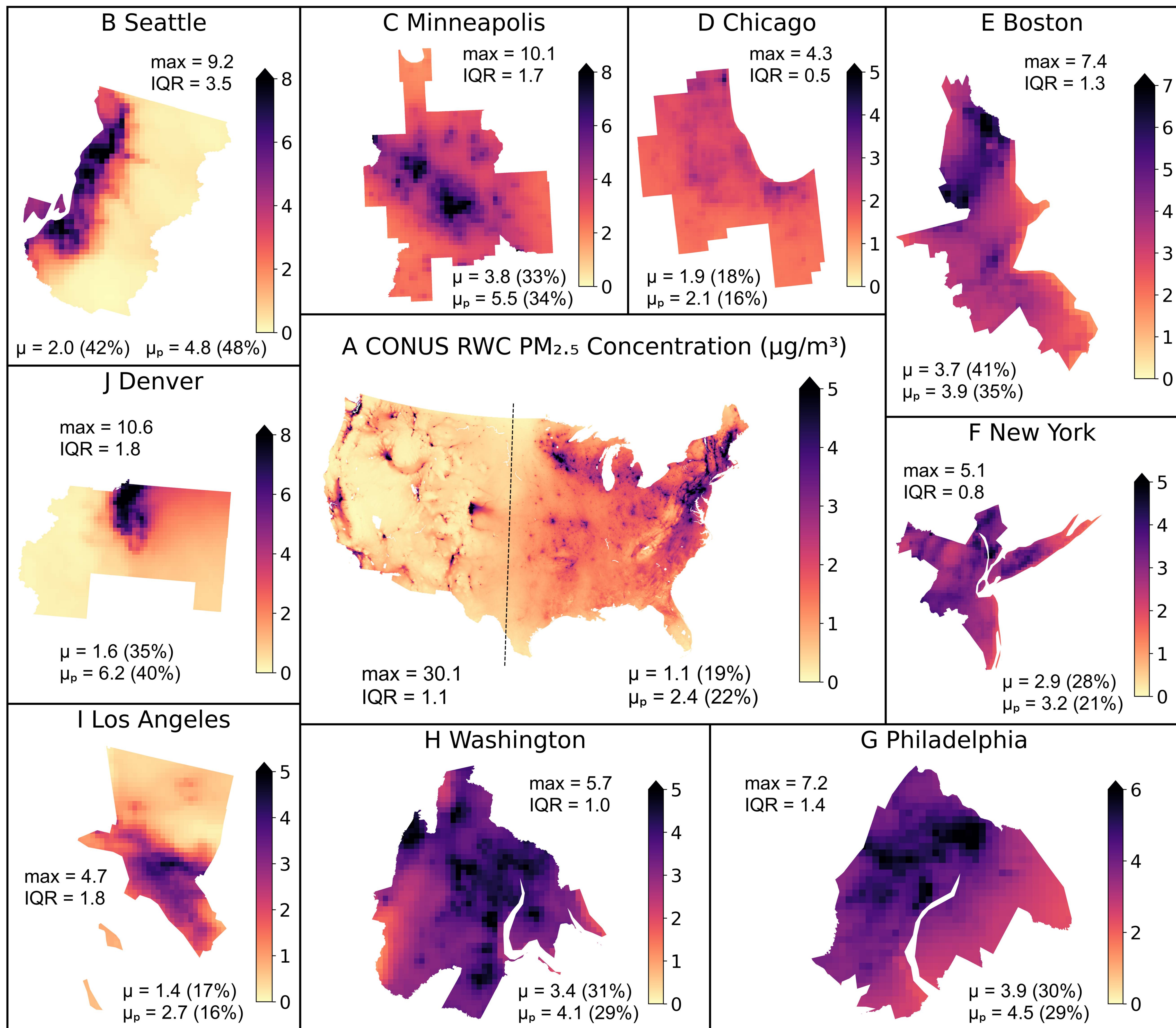


# Simulated concentrations of wintertime PM<sub>2.5</sub> from residential wood combustion across the contiguous United States



The two-way coupled Community Multiscale Air Quality and Weather Research and Forecasting modeling system (WRF-CMAQ) was used to simulate wintertime fine particulate matter (PM<sub>2.5</sub>) attributable to residential wood combustion (RWC) over the contiguous United States (CONUS). Although RWC serves as the primary heating source for only ~2% of U.S. homes, our results indicate that it accounts for 22% of winter population exposure to PM<sub>2.5</sub>, especially in the US's most prominent cities. This figure presents the first known application of two-way coupled WRF-CMAQ over the contiguous United States (CONUS) at a 4-km horizontal resolution, requiring more than 300,000 core-hours on the QUEST high-performance computing cluster. The combination of broad spatial coverage and high resolution enables us to both assess national-scale trends and intra-city pollution dynamics.

PM<sub>2.5</sub> concentrations (µg/m<sup>3</sup>) are visualized for **(A)** the CONUS and **(B-J)** nine of the twenty most populated combined statistical areas (CBSA): **(B)** Seattle-Tacoma-Bellevue, WA, **(C)** Minneapolis-St. Paul-Bloomington, MN-WI, **(D)** Chicago-Naperville-Elgin, IL-IN-WI, **(E)** Boston-Cambridge-Newton, MA-NH, **(F)** New York-Newark-Jersey City, NY-NJ-PA, **(G)** Philadelphia-Camden-Wilmington, PA-NJ-DE-MD, **(H)** Washington-Arlington-Alexandria, DC-VA-MD-WV, **(I)** Los Angeles-Long Beach-Anaheim, CA, **(J)** Denver-Aurora-Lakewood, CO. For each CBSA, mean RWC PM<sub>2.5</sub> concentration (µ) and percent of mean PM<sub>2.5</sub> concentration from all sources, population-weighted mean RWC PM<sub>2.5</sub> concentration (µ<sub>p</sub>) and percent of population-weighted mean PM<sub>2.5</sub> concentration from all sources, RWC PM<sub>2.5</sub> concentration interquartile range (IQR), and maximum RWC PM<sub>2.5</sub> concentration (max) are provided. The black dashed line in **(A)** is the 100°W meridian.

This figure is the central visualization of our recent *Science Advances* study assessing the air-quality, health, and equity impacts of PM<sub>2.5</sub> from residential wood combustion. As of 4 February, the study has been covered by more than 50 news outlets, underscoring the potential importance of RWC as a target for air-pollution mitigation.