# Unequal access to air conditioning in 115 US metro areas

## Objective

- Residential air conditioning (AC) is the most effective method of adapting to extreme high temperatures, and is a big determinant of heat vulnerability
- Differences in residential AC at inter-urban and regional scales have been characterized, but *intra*-urban AC variation remains poorly characterized
- We estimate AC prevalence at the census tract level for 115 US metro areas, elucidating how AC both varies within cities and correlates with other indicators of heat vulnerability

## Approach

- Using American Housing Survey microdata, we empirically estimate the probability of household presence of any AC using a multi-level mixed model
- We merge the fitted statistical model with American Community Survey (ACS) data to construct tract-level predictions of residential AC

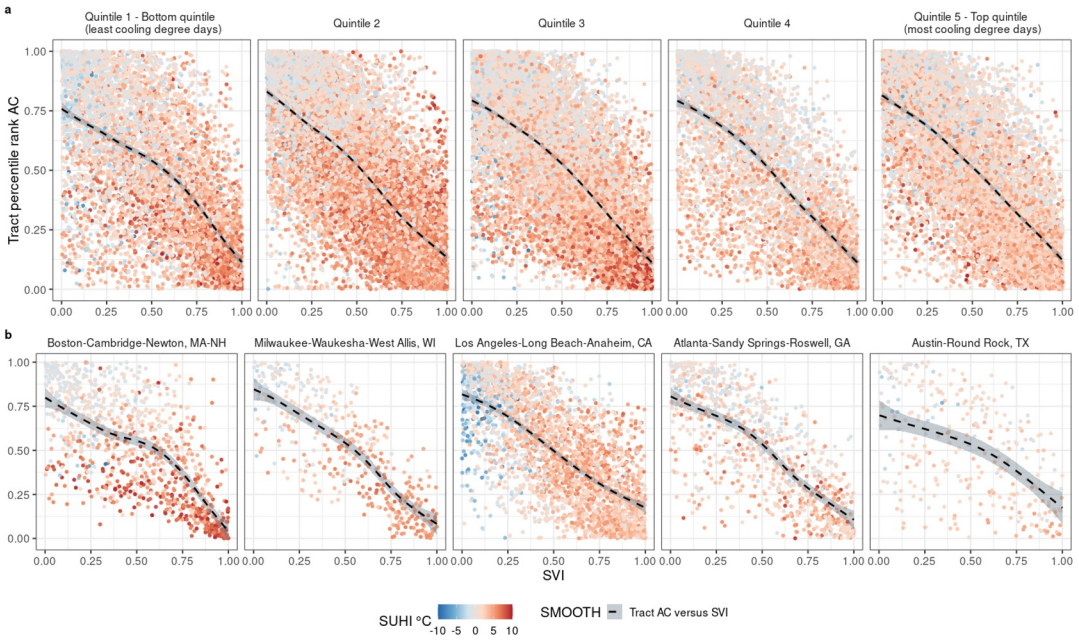


**Figure:** Intersection of relative AC prevalence, social vulnerability, and surface urban heat island (SUHI) intensity. Panels show percentile rankings of census tract AC prevalence and social vulnerability index (SVI) score, and the smoothed trend, for (a) cities ranked by quintiles of cooling degree days, and (b) illustrative metro areas from each quintile. Lowest SUHI values are colored blue, highest values are colored red.

## Impact

- There is a fundamental inequality in the intra-urban availability of residential AC across US metro areas whereby census tracts in and around the urban core exhibit systematically lower relative rankings of AC compared to their outlying counterparts and this trend persists regardless of locational context and regional climate
- This pattern of AC inequality is strongly correlated with disparities in social vulnerability and urban heat amplification
- Results demonstrate that differential AC prevalence compounds existing disparities in urban populations' heat vulnerability, with the potential for differences along any of the three dimensions examined to manifest in substantial differences in adverse health outcomes

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