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**Plain Language Summary:** Surface air temperature (SAT) in many Chinese cities has experienced dramatic increase due to rapid urbanization and global warming. This study built several linear regression equations by linking SAT trend with a modified urban impact indicator. Severe UHI effects on annual mean and minimum SATs of the 45 urban stations in mainland China during 1954–2013 are found.

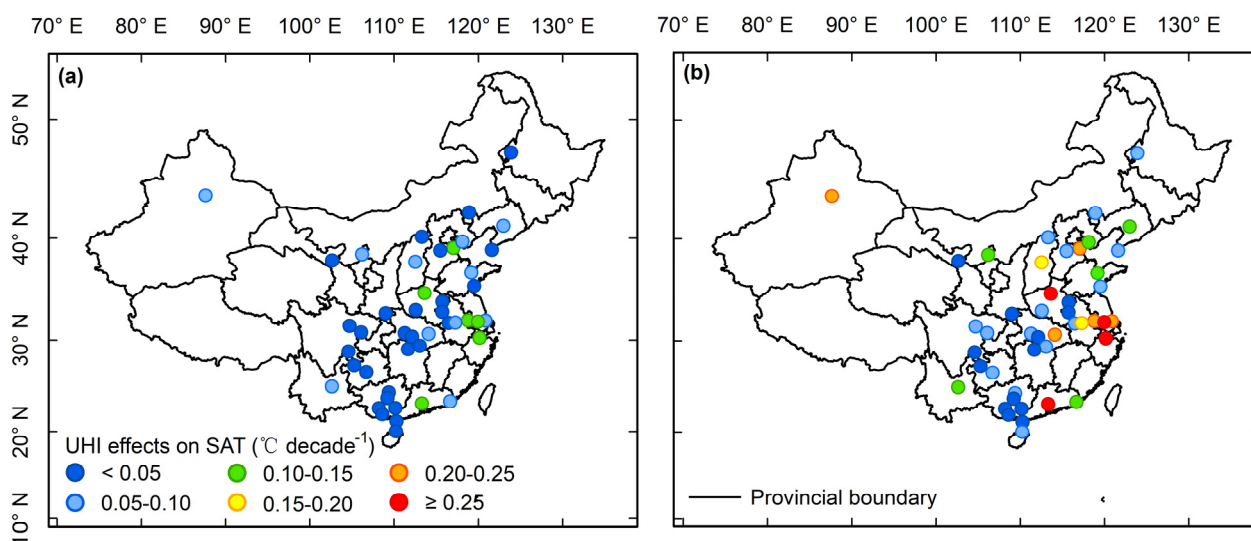


Figure 1. Distribution of the UHI effects on the annual averaged daily (a) mean and (b) minimum surface air temperature (SAT) trends for the 45 urban stations in mainland China during 1954–2013.

- A modified urban impact indicator ( $MU_{ii}$ ) representing the extent to which the observed temperature from a given station was influenced by UHI effects is proposed.
- Several linear regressions between difference in the SAT trend between the urban and adjacent stations and difference in the  $MU_{ii}$  change between the urban and adjacent stations for the 45 station pairs are built.
- The annual averaged daily mean and minimum SAT trends of the 45 urban stations in mainland China during 1954–2013 are approximately 0.05 and 0.11  $^{\circ}\text{C decade}^{-1}$ , respectively, accounting for 18% and 31% of the overall warming trends, respectively.