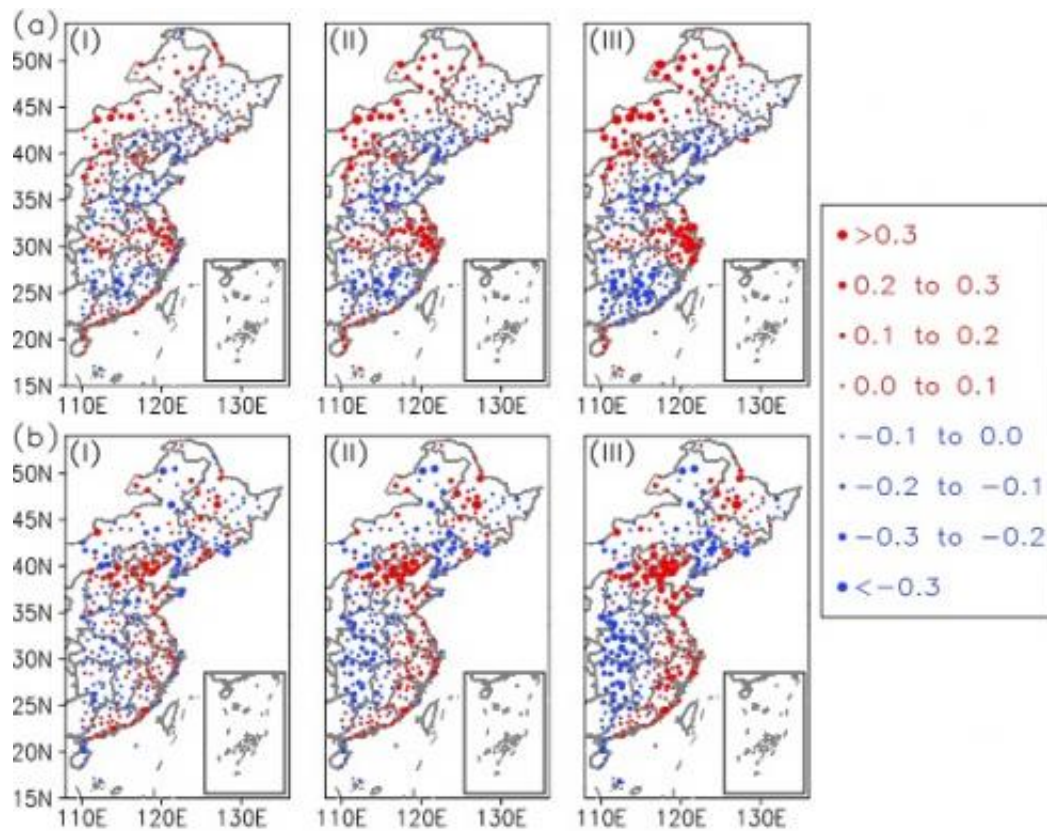


Urbanization and surface warming in eastern China

May 13 2013



This shows moving spatial anomalies of seasonal mean surface air temperature trends for three types of filtering window sizes (I: 8°×8°, II: 12°×12°, III: 16°×16°) for (a) summer and (b) winter (Unit: °C per decade).. Credit: Science China Press

A recent study indicated that the urbanization in eastern China has

significant impact on the observed surface warming and the temporal-spatial variations of urbanization effect have been comprehensively detected.

This work was led by YANG XiuQun, professor of meteorology in the Institute for Climate and Global Change Research, School of Atmospheric Sciences at Nanjing University. The article entitled "Urbanization and heterogeneous surface [warming](#) in eastern China" was published in *Chinese Science Bulletin*, 2013, No. 12.

Urbanization, as one of the most significant processes in land use/cover change, can not only alter surface vegetation distribution, but also affect surface energy and water balance. Some previous studies indicated that urbanization has little impact on surface warming. However, recent investigations have suggested that urbanization plays an essential role in regional climate change.

China has been experiencing intensive urbanization since the 1980s. Due to close ties in social and economic aspects, single cities have expanded to form distinctive city clusters in eastern China, such as the Beijing-Tianjin-Hebei (BTH), [Yangtze River](#) Delta (YRD) and Pearl River Delta (PRD) city clusters. Combining the social needs with scientific issues, Professor YANG XiuQun and his group dedicate to explore the climatic effect of urbanization in eastern China from observation and simulation perspectives. The objective of their work is to estimate the effect of urbanization on surface air temperature (SAT) change, detect the seasonal variation of urban warming in different regions, and analyze the impact of urbanization on maximum and minimum temperatures.

With the homogeneity-adjusted SAT data at 312 stations in eastern China for 1979-2008 and the Defense [Meteorological Satellite Program](#) /Operational Linescan System (DMSP/OLS) nighttime light data, the spatial heterogeneities of the SAT trends on different scales are detected

and the impact of urbanization in eastern China on surface warming is analyzed.

Results show that the urbanization can induce a remarkable summer warming in YRD city cluster region and a winter warming in BTH city cluster region. The YRD warming in summer primarily results from the significant increasing of maximum temperature, with an estimated urban warming rate at 0.132-0.250°C per decade, accounting for 36%-68% of the total regional warming. The BTH warming in winter is primarily due to the remarkable increasing of minimum temperature, with an estimated urban warming rate at 0.102-0.214°C per decade, accounting for 12%-24% of the total regional warming.

The study finds that urbanization has considerable influence on the regional climate change. Therefore, a more reasonable urban planning should be considered in order to mitigate regional surface warming. In addition, the climatic effect of urbanization features obvious temporal-spatial differences, which may be associated with the variation of regional climatic background and the change of anthropogenic heat release. Detection and assessment of the climatic effect of [urbanization](#) is of great significance for further understanding the relationship between urban development and climate change.

More information: Wu K, Yang X Q. Urbanization and heterogeneous surface warming in eastern China. *Chin Sci Bull*, 58(12):1363-1373, [doi: 10.1007/s11434-012-5627-8](https://doi.org/10.1007/s11434-012-5627-8)

Provided by Science China Press

Citation: Urbanization and surface warming in eastern China (2013, May 13) retrieved 23 June 2024 from <https://phys.org/news/2013-05-urbanization-surface-eastern-china.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.