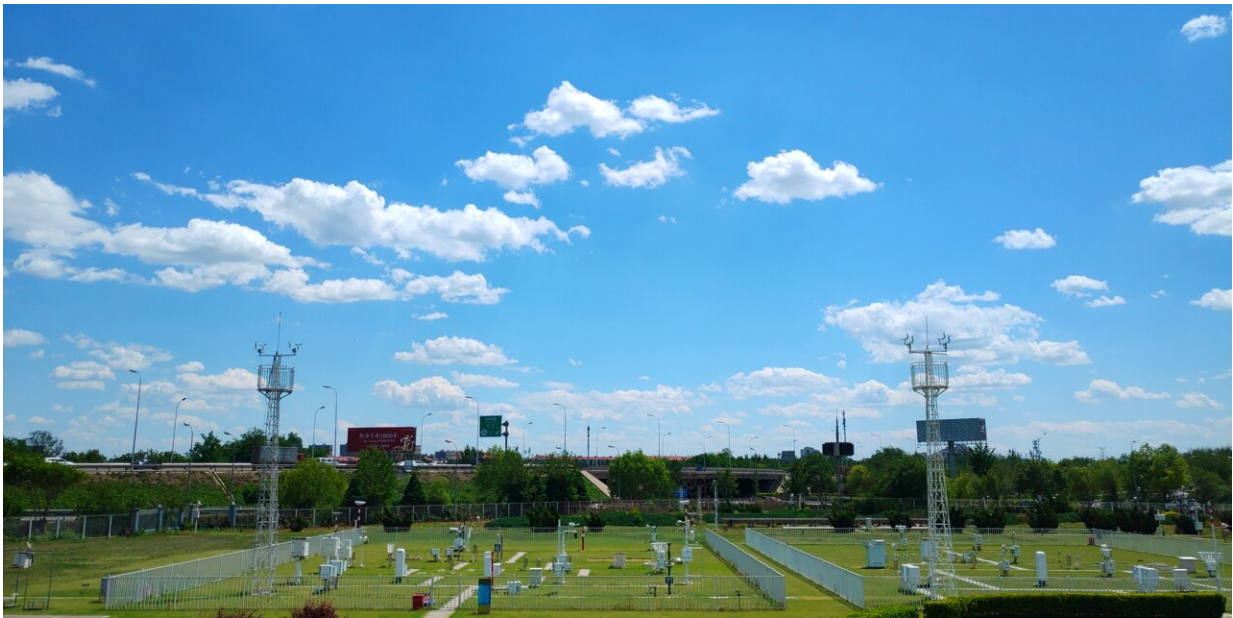


# Study explores over a century of temperature trends at Beijing Observatory

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The Beijing Observatory, a site of significant historical climate data, plays a crucial role in understanding long-term climate trends. Credit: Image by Jiali Yin

In a significant stride towards understanding climate change, a recent study published in the [\*International Journal of Climatology\*](#) has successfully homogenized and analyzed over a century's worth of daily temperature data from the Beijing Observatory (BO), spanning from 1915 to 2021.

This comprehensive study, led by researchers from the Institute of Atmospheric Physics at the Chinese Academy of Sciences, Beijing Meteorological Data Center and Beijing Municipal Climate Center, addresses the crucial challenge of data inhomogeneity in long-term climate records.

Climate change remains a pressing global issue, demanding [accurate data](#) for informed decision-making and policy development. However, long-term climate data often suffers from inconsistencies due to various non-natural factors like station relocations, changes in instrumentation, and observation practices. These factors introduce biases, making it difficult to accurately assess climatic trends. By homogenizing these data series, researchers can correct these biases and derive more reliable conclusions about [climate change](#).

The study utilized a novel homogenization method that effectively handles complex daily temperature series. By employing more complete historical records and advanced statistical techniques, the researchers identified and adjusted for three primary types of non-climatic biases: station relocations, calculation methods and measurement transitions.

Adjustments for these biases ranged from  $-1.13$  to  $0.63^{\circ}\text{C}$ ,  $-0.29$  to  $0.23^{\circ}\text{C}$ , and  $-0.13$  to  $0.00^{\circ}\text{C}$ , respectively. After these adjustments, the newly homogenized temperature series revealed a significant warming trend of  $0.199^{\circ}\text{C}$  per decade from 1915 to 2021, with winter showing the most pronounced increase.

"Compared to previous studies, our new homogenized data takes into account and reduces the impact of three non-natural factors, better reflecting the true changes in temperature." Dr. Zhen Li, the corresponding author and Associate Professor at the Institute of Atmospheric Physics, explained, "The previous temperature trends ranged from  $0.136$  to  $0.177^{\circ}\text{C}$  per decade. Our more effective

adjustments, especially those accounting for station relocations to more [urban areas](#), revealed a higher warming trend."

The new study highlights the necessity and effectiveness of homogenization process in providing a more accurate picture of climate change. Notably, the team also developed the longest continuous daily [temperature](#) sequence for Shanghai (1873–2019) and constructed homogenized datasets for [China and Greece](#), facilitating comparative studies of regional climate extremes.

"These [collaborative efforts](#) have been invaluable. By combining resources and expertise, we've been able to produce high-quality climate data that is essential for accurate climate change assessments," added Dr. Li.

**More information:** Jing Chen et al, A method for homogenization of complex daily mean temperature data: Application at Beijing Observatory (1915–2021) and trend analysis, *International Journal of Climatology* (2024). [DOI: 10.1002/joc.8434](https://doi.org/10.1002/joc.8434)

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