Urban air pollution estimates may overshadow full picture for China

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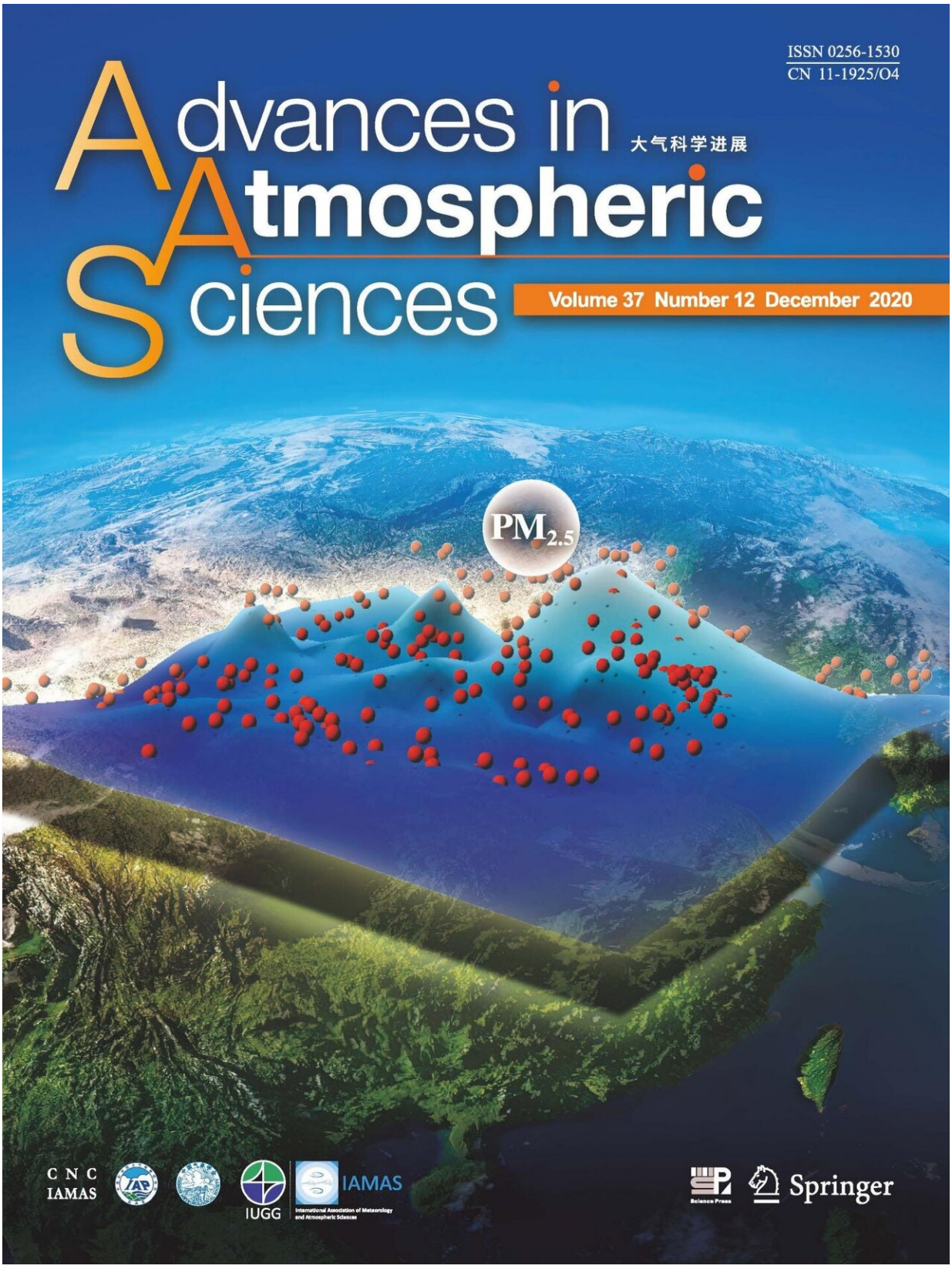
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The graph depicts the differences in wintertime PM2.5 concentrations between urban-dominated sites (the dots) and nonurban-dominated regions (the curved surface) in China. Credit: Advances in Atmospheric Sciences

For the first time, researchers have compared air pollution in urban and suburban areas across all of China. Using data from the China National Environmental Monitoring Center (CNEMC), the researchers found that one air pollutant, particulate matter ($PM_{2.5}$), may be overestimated in winter, while another pollutant, ozone (O_3), is significantly underestimated.

The researchers published their results in the peer-reviewed journal *Advances in Atmospheric Sciences*.

"Since the urban region accounts for only 2% of the whole country's area, the urban-dominant air quality data from the CNEMC network may overestimate winter $PM_{2.5}$ but underestimate winter O_3 over the vast domain of China," said paper author Xu Yue, professor at Nanjing University of Information Science & Technology. "The study suggests that the CNEMC monitoring data should be used with caution for evaluating chemical models and assessing ecosystem health, which require more data outside urban areas."

Both $PM_{2.5}$ and Ozone are respiratory hazards and can be detrimental to human and animal health, as well as ecosystems.

"The differences between urban and non-urban areas, such as the intensity of human and plant activities, can lead to differences of ozone and $PM_{2.5}$ concentrations between land types," Yue said. "Our study tries to answer the question: How different is the air pollution between urban and non-urban areas in China?"

The researchers examined air quality data from 1,171 urban and 110 suburban sites built by the CNEMC during an observational period from 2015 to 2018. "The pattern whereby the non-urban ozone concentrations and the urban $PM_{2.5}$ level are higher dominates across time and space," Yue said. "Such contrast is significant in winter but insignificant in summer."

Since most of the data is available from urban sites, it does not likely apply uniformly across the rest of the country, according to Yue. This can be problematic when it comes to designing efforts to improve pollution and conserve plant life in suburban or rural areas.

"We suggest that more nonurban sites are necessary to build for better representation of air pollution level over the vast domain in China," Yue said. Ultimately, the researchers plan to improve their analysis model to achieve the most accurate estimation of air pollution impacts on ecosystem functions in China.

More information: Lan Gao et al, Comparison of Ozone and PM2.5 Concentrations over Urban, Suburban, and Background Sites in China, *Advances in Atmospheric Sciences* (2020). DOI: 10.1007/s00376-020-0054-2

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