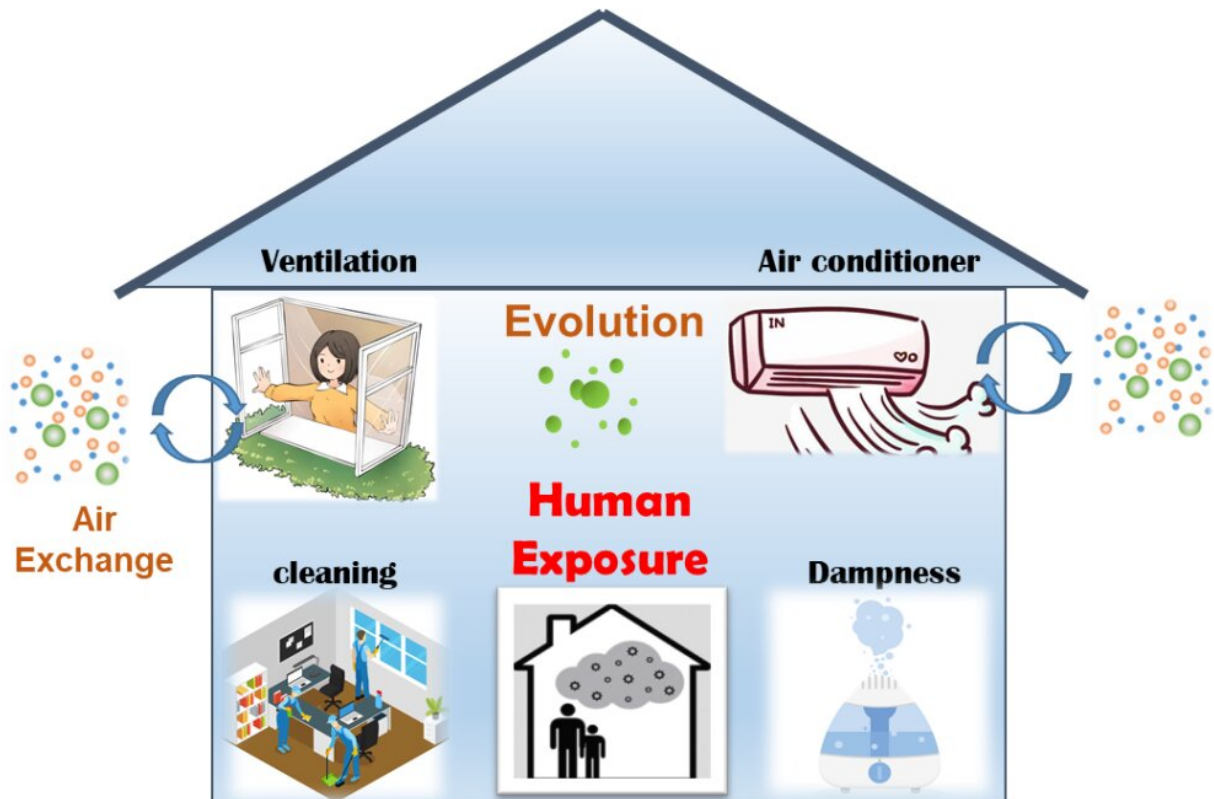


Study helps to better understand the link between indoor and outdoor air quality

May 7 2021



Sources and evolution of particulate matter in the indoor environment. Credit: Li Junyao

People spend about 80-90% of their time indoors. Compared to outdoor air quality, the indoor air quality is more relevant to people's health. Therefore, understanding the levels, sources and evolution of particulate

matter (PM) indoors is important for the accurate evaluation of people's health risks to aerosol exposure.

A research team led by Prof. Yele Sun from the Institute of Atmospheric Physics (IAP) of the Chinese Academy of Sciences deployed a time-of-flight [aerosol](#) chemical speciation monitor (ToF-ACSM) to measure time series and mass spectra of non-refractory species in a typical academic office in IAP. The study was published in *Indoor Air*.

The researchers measured the concentration and chemical composition of indoor PM_{2.5} for one month along with simultaneous measurements outdoors. They also performed open-close window and dampness experiments in order to figure out the mechanism of indoor/outdoor air exchange, and the influence of increased humidity on the indoor PM_{2.5}.

They found that the indoor aerosol species were primarily from outdoor air exchange. "The indoor and outdoor variation trends are similar for most of aerosol species," said Prof. Sun, "However, the chemical compositions of PM_{2.5} are different. The concentration of organic aerosol from fossil fuel combustion and ammonium nitrate decreases because they evaporate or turn from particle to gas upon indoor transport when the indoor temperature is much higher than the outside in winter."

It is often believed that opening windows to ventilate can improve the [indoor air quality](#). However, according to this newly published study, the PM mass concentration outdoors is significantly higher than that inside. Elevated [natural ventilation](#) will increase PM exposure indoors instead, and this increased exposure might be prolonged when outdoor PM gets cleared up. "So it's not a good idea to open windows when the air quality is not good outdoors." Said Prof. Sun.

The team also investigated the effect of air humidifiers, which are widely used to increase the indoor humidity. Prof. Sun said, "The

increase of indoor relative humidity could lead to a significant increase in PM2.5 mass concentration, especially for organic aerosol. The increase is likely due to the partitioning of hygroscopic organic species from the gas phase to the particle phase in [indoor air](#)."

"Better understanding of the links between indoor and outdoor air quality will be needed in the future, as well as a more quantitative assessment of human exposure risks indoors," said Sun.

More information: Junyao Li et al, Real-time characterization of aerosol particle composition, sources and influences of increased ventilation and humidity in an office, *Indoor Air* (2021). [DOI: 10.1111/ina.12838](#)

Provided by Chinese Academy of Sciences

Citation: Study helps to better understand the link between indoor and outdoor air quality (2021, May 7) retrieved 30 April 2024 from <https://phys.org/news/2021-05-link-indoor-outdoor-air-quality.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.