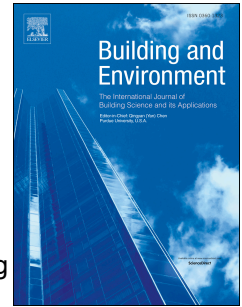


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Indoor air quality and occupants' ventilation habits in China: seasonal measurement and long-term monitoring

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Abstract

It is very important to know the current level of indoor pollution and occupants' ventilation habits. With this aim, this study presents an investigative project that covered five climate zones in China. The project consisted of two parts: long-term monitoring and seasonal measurements. For the long-term monitoring, we installed indoor air quality (IAQ) sensors, window state sensors, and mechanical ventilation sensors inside homes. In regard to IAQ, The median indoor 24-hour PM_{2.5} concentration ranged from 18 to 49 $\mu\text{g}/\text{m}^3$. The median indoor and outdoor 24-hour PM_{2.5} concentrations were similar for most of the regions. The 24-hour averaged indoor CO₂ concentrations were lower than 1000 ppm for all regions in all four seasons. Northern China usually had higher indoor CO₂ concentrations than did southern China. In regard to occupants' behavior, in naturally ventilated homes, both the window-opening probability and open-window duration per day increased from the north to the south of China in winter. According to the example of mechanically ventilated Apartments, where pressure sensors were used to monitor the relative pressure at the air outlet of a mechanical ventilation system, the occupants used the ventilation system mainly in winter and spring. For the seasonal investigation, indoor formaldehyde concentrations in 224 homes were measured in four seasons (sampling time: 20 min). In summer, the indoor formaldehyde concentration reached its peak for the year, with about 35% of homes having concentrations larger than 100 $\mu\text{g}/\text{m}^3$ under closed conditions (doors and windows have been closed for more than 12 hours).

Keywords: PM_{2.5}; CO₂; Formaldehyde; Ventilation habits

1. Introduction

Indoor air pollution has a significant impact on people's comfort, health and performance [1]. Formaldehyde and PM_{2.5} are common pollutants that adversely affect human health. Previous studies have found that exposure to high formaldehyde concentration can cause eye and nasal irritation [2, 3], and long-term exposure

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