



Effect of air pollution on sunshine hours in China

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This study investigates the changes in sunshine hours in relation to API (Air Pollutant Index) across China. Data were collected from a total of 38 cities over the period of 1960–2009. A significant decline (average of 16.7%) is noted in sunshine hours for the 1960s–2000s over 86% of the country. This decline, with maximum in winter (21.5%) and minimum in spring (6.9%), is mainly prevalent over regions around Sichuan Basin (22.4%), North China Plain (18.8%), and Yangtze River Delta (18.2%). While the sunshine hour decline is largely in the 20th century (with the strongest drop in the 1980s and the least in the 1990s), it rebounds by 3.0% after 2000. This sunshine hour recovery mainly occurs in spring seasons and in South China. For especially in winter seasons and the North China region, API is negatively related with sunshine hours. For days with $API > 80$, sunshine hours are on the average 0.7 h d⁻¹ (8.4%) shorter than for days with $API \leq 80$ under clear-sky condition. In cities with average daily $API \leq 80$, sunshine hour decline for the 1960s–2000s is 0.8 h d⁻¹ (13.4%). Also in cities with average daily $API > 80$, sunshine hour decline over the same period is 1.0 h d⁻¹ (15.9%). Winter seasons with highest API (90) exhibit the highest sunshine hour decline (21.5%). The study shows that spatiotemporal changes in sunshine hours in China could largely be explained in terms of API. API decreasing has been proved as the basic cause of the recent sunshine hour recovery in China, especially in the 13 sunshine hour increasing cities.

Keywords: Spatiotemporal trend, air pollution index, total cloud cover, precipitation