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## SPATIAL CHARACTERISTICS AND IMPROVEMENT OF AIR QUALITY IN WUHAN, CHINA

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## Abstract

Great efforts have been devoted to the mitigation of air pollution since the implementation of the Action Plan (2013 -2017) for Air Quality Improvement in Wuhan, a provincial city situated in Central China. In this study, trend analysis demonstrated notable decreases in the concentrations of SO<sub>2</sub>, NO<sub>2</sub> and PM<sub>10</sub> since 2013. Similarly, the PM<sub>2.5</sub> level showed a linear decline from 2013 to 2017, while CO and O<sub>3</sub> exhibited statistically insignificant annual variations. Nevertheless, NO<sub>2</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub> failed to comply with the Grade II limits of China Ambient Air Quality Standard. As for the seasonal pattern, PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub>, CO, and NO<sub>2</sub> were at the highest level in winter and the lowest level in summer, whereas the O<sub>3</sub> concentration peaked in summer. Except for summer, SO<sub>2</sub> exhibited a bimodal pattern with an early noon peak and an insignificant late evening peak around 23:00. On average, PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>2</sub>, and CO concentrations were higher during night than those of daytime, and declines were observed in afternoon. In general, high O<sub>3</sub> concentration appeared in the suburban outskirts of Wuhan, while other pollutants exhibited higher concentrations in the urban area. Cluster analysis grouped the 21 monitoring sites into three or four clusters of various pollution levels. Grouping results were pollutant-dependent, revealing the existence of pollutant-specific spatial heterogeneity. Each pollutant showed a different response to the wind field, suggesting various sources for individual pollutants.

Key words: air quality, temporospatial distribution, wind dependence, Wuhan

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