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Editorial

Ozone Pollution and Its Effects in China

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Ozone (O_3) pollution has become a significant environmental challenge in China [1]. With the rapid growth of the economy and acceleration of urbanization, industrial emissions, increased vehicle numbers, and rising energy consumption have all significantly elevated O_3 concentrations in the atmosphere [2]. As a key component of photochemical smog, O_3 not only affects air quality but also poses widespread negative impacts on public health, agricultural productivity, and ecosystems [3]. The health risks associated with O_3 pollution are considerable [4]. High concentrations of O_3 can irritate the respiratory tract, increasing the risk of asthma, chronic bronchitis, and other respiratory diseases [4]. Additionally, O_3 contributes to decreased air quality, affecting the quality of life for residents [5]. In agriculture, O_3 negatively impacts crop growth and yield, reducing the economic benefits of farming. Ecosystems are also affected, as elevated O_3 levels impair plant photosynthesis and growth, disrupting ecological balance [6].

In this context, the Special Issue of *Atmosphere* titled "Ozone Pollution and Effects in China" presents a collection of research papers that delve into the sources, dynamics, and impacts of O_3 pollution, a critical environmental challenge in China. This editorial summarizes recent advancements in this field, identifies existing knowledge gaps, and discusses how the contributions in this issue address these gaps while also considering future research directions.

The papers in this issue provide a comprehensive overview of O_3 pollution, exploring its sources, transport mechanisms, and impacts on the environment and human health. Research in the Yangtze River Delta identified key factors influencing O_3 concentration, highlighting the significant impact of forest coverage and economic activities. The study emphasized the complex interplay of multiple factors, suggesting that regional O_3 variability results from a combination of economic and environmental drivers. In the Guanzhong Basin, studies differentiated between direct and indirect transport of O_3 and its precursors using the CAMx model to reveal how specific meteorological conditions influence O_3 formation. This research underscored the importance of understanding the diverse pathways through which emissions affect downwind areas. Long-term monitoring in northwest China identified typical seasonal and diurnal fluctuations in O_3 levels, demonstrating a significant positive correlation between O_3 and temperature. These findings highlight the need for targeted seasonal pollution control measures. A study in Jinan examined the mechanisms behind summertime O_3 pollution events, finding that regional transport of O_3 and its precursors played a crucial role. The study advocated for strengthened regional cooperation to manage O_3 and its precursors effectively. A study also assessed the impact of O_3 on crop yields and physiological characteristics. Experiments on winter wheat, soybean, and summer maize revealed significant yield losses and physiological damage due to elevated O_3 levels, highlighting the need for strategies to mitigate the adverse effects of O_3 on food security.

Despite significant advancements in understanding and managing O_3 pollution, several key knowledge gaps persist. Firstly, there is a need for more comprehensive source apportionment analyses that consider a broader range of economic, environmental, and meteorological variables [7]. Additionally, the mechanisms of inter-regional transport of O_3

and its precursors are not fully understood, necessitating further research to develop effective cooperative strategies for regional pollution control [8,9]. The impact of climate change on O_3 pollution patterns also remains a critical area for future study, as changing climatic conditions could significantly alter pollution dynamics. Finally, there is a pressing need for more research to assess the long-term health and ecosystem impacts of O_3 exposure, especially concerning vulnerable populations and sensitive ecological regions [10].

The papers in this Special Issue address many of these gaps by providing detailed analyses of the factors driving O_3 pollution, enhancing our understanding of transport mechanisms, highlighting seasonal and diurnal patterns, investigating the effects of O_3 on agricultural productivity, and showcasing technological advancements in O_3 monitoring. Future research should focus on developing integrative models that combine source apportionment, transport dynamics, and climate projections; conducting collaborative regional studies; implementing long-term epidemiological studies; and developing adaptive management strategies that can respond to the dynamic nature of O_3 pollution and its interactions with climate change.

In conclusion, this special issue of *Atmosphere* contributes significantly to our understanding of O_3 pollution in China. By addressing critical knowledge gaps and proposing future research directions, it paves the way for more effective and informed strategies to mitigate the adverse effects of O_3 on the environment and public health.

Conflicts of Interest: The author declares no conflicts of interest.

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