frontiers | Frontiers in Environmental Science

TYPE Editorial
PUBLISHED 22 February 2023
DOI 10.3389/fenvs.2023.1166400

OPEN ACCESS

EDITED AND REVIEWED BY
Shupeng Zhu,
University of California, Irvine,
United States

*CORRESPONDENCE
Lei Yao,
lei_yao@fudan.edu.cn

SPECIALTY SECTION
This article was submitted
to Atmosphere and Climate,
a section of the journal
Frontiers in Environmental Science

RECEIVED 15 February 2023
ACCEPTED 17 February 2023
PUBLISHED 22 February 2023

CITATION
Yao L, Chu B, Wang J and Wang M (2023),
Editorial: Atmospheric chemistry in the
urban air.
Front. Environ. Sci. 11:1166400.
doi: 10.3389/fenvs.2023.1166400

Editorial: Atmospheric chemistry in the urban air

Lei Yao[1]*, Biwu Chu[2], Jiandong Wang[3] and Mingyi Wang[4]

[1]Shanghai Key Laboratory of Atmospheric Particle Pollution and Prevention (LAP$_3$), Department of Environmental Science & Engineering, Fudan University, Shanghai, China, [2]State Key Joint Laboratory of Environment Simulation and Pollution Control, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China, [3]School of Atmospheric Physics, Nanjing University of Information Science and Technology, Nanjing, China, [4]Chemistry & Chemical Engineering, California Institute of Technology, Pasadena, CA, United States

KEYWORDS

atmospheric chemistry, urban air, air quality, volatile organic compounds, fine particles

Editorial on the Research Topic
Atmospheric chemistry in the urban air

Urban atmospheric chemical processes directly affect air quality of megacities. Owing to the synergistic effect of various pollutants in urban atmosphere, urban air pollution is complex and puzzling. Sustainable urban development is being hindered and urban air quality is deteriorating. Moreover, with the fast urbanization and industrialization in many developing (e.g., (China) and developed countries, more and more people live in cities or city clusters. From the statistics by United Nations Department of Economic and Social Affairs, more than 50% of the world's population are living in urban areas, and the proportion is expected to increase to 68% by 2050. Urban air quality is crucial to human health, especially for people living in urban areas. The recent examples observed in various urban atmospheric environments especially in China have demonstrated the need to broaden the research field of urban atmospheric chemistry and refine more theoretical modeling mechanisms.

In recent years, urban complex air pollution is mainly affected by ozone (O_3) and fine particles together. In urban environments, O_3 formation is mainly attributed to atmospheric chemical processes of volatile organic compounds (VOCs) together with nitrogen oxides (NOx). As a key prerequisite for ozone and fine particles, the study of the chemical composition, sources and chemical reaction mechanisms of VOCs is essential for the coordinated control of ozone and fine particles. However, in urban air, due to complex chemical compositions and the limitations of measurement methods, the deeper understanding of atmospheric chemical processes leading to the formation of O_3 and fine particle pollution, as well as their impacts on air quality at the molecular level remain lacking. Recent developments in measurement technology are of great help in revealing atmospheric chemical processes at the molecular level in large cities.

The purpose of this Research Topic is to collect original articles and reviews to better understand atmospheric chemical processes at the molecular level and their impacts on urban air quality of megacities. This issue features contributions on the study of air pollutant characteristics in a fine chemical industrial park (FCIP), VOC pollution in the heavy industrial base in Northeast China, the emission characteristics of carbonyl compounds in the actual working process of construction machinery in China and the chemical compositions and sources of VOCs in four articles with contributions from 41 authors. Selected highlights from each paper are summarized below:

The paper Pang et al. observed spatial and temporal variations of air pollutants through 30 sensor-based air quality monitoring stations established around a typical fine chemical industrial park (FCIP) in the Yangtze River Delta region of China, revealing the sources of air pollution in industrial parks.

The paper Shang et al. conducted a systematic survey of VOCs' information for the first time in Jilin Province based on cruise monitoring for 2 months and identified industries that emit high levels of VOCs and these VOCs with greater ozone formation potential (OFP).

The paper Shen et al. assessed a total of 21 construction machineries *via* PEMS in the real work process to better understand the emission characteristics of carbonyl compounds in the actual working process of construction machinery in China.

The article Shan et al. monitored 117 volatile organic compounds in 13 cities in Beijing-Tianjin-Hebei Urban Agglomeration and Fenwei plain. The results of this study show that solvent usage, gasoline evaporation, vehicle emissions, petrochemical industry and combustion were essential VOCs sources in 13 cities.

Overall, this Research Topic highlights the challenges and opportunities for urban atmospheric chemistry through a variety of case studies and techniques currently being used and/or developed to conduct a larger and broader scope of atmospheric chemistry research. We hope that more relevant atmospheric chemistry research will be presented to help solve more atmospheric chemistry pollution problems. Finally, we would like to thank the reviewers and all authors for their contributions to this Research Topic.

Author contributions

LY wrote the manuscript. All other authors edited and commented on the manuscript.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note