applied sciences

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Editorial

Sources, Processing, Transport, Health and Climate Impacts of Air Pollutants

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1. Introduction

Atmospheric pollutants exist in both gaseous and particulate form and they have significant impacts on human health, air quality, and the climate. Pollutants such as nitrogen dioxide, sulfur dioxide, and volatile organic compounds (VOCs) could lead to irritation, respiratory problems, heart diseases, and even premature death [1]. Certain VOCs could contribute to tropospheric ozone formation [2]. Pollutants such as fine and coarse particles and black carbon (BC) could have direct and indirect effects on the climate by altering the incoming solar radiation and affecting the cloud formation process [3,4]. The deposition of gaseous elemental mercury (GEM) on land and the absorption of GEM in the ocean could have consequences for health and the environment [5]. This Special Issue, "Sources, processes, and transport of air pollutants in the atmosphere and their implications on human health and climate", collects articles describing recent efforts in studying atmospheric pollutants, the impact of air pollutions on ambient air quality, and other related topics on atmospheric aerosols.

2. An Overview of Published Articles

Irei [contribution 1] investigated for the first time the enhancement of the uptake of GEM by various bulk solutions under neutral, slightly basic seawater, and acidified conditions. The results demonstrated a significant enhancement in the uptake of GEM under acidified conditions, which could represent a possible sink mechanism. Furthermore, when measuring stable mercury isotope ratios of total gaseous mercury and total suspended particulate matter (PM) in the Aso region in Japan, Irei [contribution 5] was able to verify the release of mercury during an open-field biomass burning event. Monitoring stations have been shown to be useful in providing continuous stationary measurements for verifying different source emissions and their impacts. Su et al. [contribution 2] reported the effort of setting up an air-monitoring sampling station powered by renewable energy in a semi-pristine area in northern Ontario, Canada. Sampling PM_{10} and $PM_{2.5}$ downwind from a mining site for trace element analysis, they assessed the impact of the mining industry activities on the local air quality. Varenik [contribution 6] reported two years of measurements of airborne PM_{10} and $PM_{2.5}$ mass concentrations, particulate BC concentrations, and silicon and phosphate concentrations in precipitation at Sevastopol in the Crimean Peninsula and used these measurements to confirm the contribution of PM from the long-range transport of desert dust. Šarkan et al. [contribution 9] investigated the relationship between PM_{10} or $PM_{2.5}$ concentrations and traffic intensity at a bus terminal, near a school area, and at a railway crossing in Slovakia. Their results suggested that metropolitan road transportation was a major source of PM at those urban sites, representing a potential threat to commuters who rely on different kinds of transportation or travel on foot [6]. Some previous studies have suggested that appropriate automotive cabin filters can help to reduce the acute health

Citation: Irei, S.; Chan, T.W. Sources, Processing, Transport, Health and Climate Impacts of Air Pollutants. *Appl. Sci.* **2024**, *14*, 1361. https://doi.org/10.3390/app14041361

Received: 24 January 2024
Accepted: 5 February 2024
Published: 7 February 2024

effects of vehicle exhaust [7]. In a laboratory study, Chan et al. [contribution 4] showed that a vehicle cabin filter was useful for removing fine and BC particles from the intake air for vehicle passengers. The use of electrostatic filters provided an immediate improvement in PM filtration efficiency up to 60% compared to standard filters. When incorporated with charcoal, the filters were useful in removing VOCs, such as benzene, toluene, ethylbenzene, and xylene, with up to 41% efficiency. Iwamoto et al. [contribution 3] studied the number concentration of the cloud condensation nuclei and cloud droplet concentrations at the summit of Mount Fuji, Japan. Their results not only indicated the contribution of urban airmass on cloud droplets, but they also showed that the degree of supersaturation was critical for predicting the number concentration of cloud droplets. Kunwar et al. [contribution 7] compared online aerosol mass spectrometer (AMS) measurements and off-line GC-MS measurements of various carboxylic acids obtained at Cape Hedo, Okinawa Island. They successfully showed that although the m/z 44 signals from AMS could not specify the types of carboxylic acids and their molecular compositions, this signal was a reasonable surrogate tracer to estimate total carboxylic acids from ambient PM. Finally, Shareef et al. [contribution 8] conducted model evaluation on three photochemical mechanisms using ambient measurements obtained from monitoring stations. They found that results varied significantly between different chemical mechanisms. The difference was more apparent in the summer, particularly for secondary pollutant species, such as O_3, H_2O_2, and secondary organic aerosols. The articles in this Special Issue demonstrate interesting new findings and ideas in atmospheric research. These articles could provide steppingstones for further progress scientific research in the future.

3. List of Contributions

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Conflicts of Interest: The authors declare no conflict of interest.

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