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*Editorial*

# Special Issue "Particulate Matter Content and Health Risk Assessment"

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The Lancet Commission on pollution and health found particulate matter to be responsible for 4.14 million deaths in 2019. Particulate-induced mortality stems primarily from cardiovascular and respiratory conditions. However, there are other known health risks to the body, including asthma and allergies, impaired cognition, and many diseases associated with ageing. Particulate matter consists of a mixture of solids and liquid droplets suspended in the air and may be composed of both chemical and biological components.

This Special Issue of *Atmosphere*, entitled "Particulate Matter Content and Health Risk Assessment", contains articles which consider particulate matter in the air of various types of environments.

Biological particulate matter constitutes a number complex entities, with variable size, shape, and composition determined by their sources and post-formation processes. The paper by Góralska et al. investigates the relationship between fungi, bacteria and smog particles in outdoor air in Lodz (Poland) during the heating season [1]. Bacteria and fungal concentrations were monitored via the Koch sedimentation method in eight parks and at two street locations. For fungi, the predominant genera were *Aspergillus*, *Penicillium* and *Alternaria*. A positive correlation between the total number of bacteria and temperature and ozone concentrations was observed, whilst there was a negative correlation with humidity and NOx levels. It was concluded that the qualitative and quantitative composition of bioaerosols could be used as a bioindicator for environmental monitoring.

Lenart-Boron et al. measured bioaerosol concentrations in a range of micro-environments in an agricultural college. These included classrooms, gyms and animal breeding facilities [2]. A six-stage Andersen impactor was used to study the concentration and size distribution of bacteria, fungi, actinomycetes and staphylococci. The microbial aerosol concentrations were below the Polish threshold values, although 60% of the total bioaerosols were found in the respirable fraction. Given the location of the college, farm animals were significant sources of bioaerosols. It was recommended sanitary conditions be improved to appropriate levels within the animal housing and that more efficient mechanical ventilation systems be considered for the indoor environment.

Resistance to antifungal drugs is increasing globally [3]. White et al. examined antifungal-resistant fungi on surfaces and in the air in a pig farm [4]. Just over a quarter of the Aspergillus isolates displayed resistance against at least one antifungal drug, while multiple isolates of *A. niger* exhibited multidrug resistance to three of the four tested antifungals. This is of concern, given that *A. niger* can be transported some distance for the source, where it could result in lethal invasive disease in susceptible patient groups.

The final paper in this Special Issue concerns ultrafine particle concentrations observed in and around airports. A 2015 study concluded that around 14,000 premature deaths per year globally emissions could be attributable to PM2.5 from global aviation emissions [5]. A review by Owen et al. investigates volatile and non-volatile elements of particulate matter emissions from aircraft engines [6]. Although the quantification of engine non-volatile particulate matter has improved for landing and take-off periods, additional research is required for emissions during flights. There is also knowledge gap relating to emissions from and the evolution of volatile particles in the aircraft exhaust plume.

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**Citation:** Colbeck, I. Special Issue "Particulate Matter Content and Health Risk Assessment". *Atmosphere* **2023**, *14*, 80. https://doi.org/10.3390/atmos14010080

Received: 7 November 2022
Accepted: 20 December 2022
Published: 30 December 2022

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In conclusion, these papers highlight the importance of knowledge of PM emissions. Additionally, three papers specifically address the microbiological components of PM, aspects which have received significant scientific and societal attention due to their importance for human health.

**Conflicts of Interest:** The author no conflict of interest.

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