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# Mineralogy of the atmosphere: Assessing environmental and health impacts of airborne particulate matter

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## Abstract

Particulate matter (PM) is ubiquitous in the atmosphere and is generated in various environments through both natural processes and human activity. Individual particles display a wide range of physical, chemical, structural and surface properties, which depend on source, formation, ageing, and transport under variable atmospheric conditions. Airborne PM, therefore, comprises a wide variety of natural and anthropogenic materials, including sea-salt, silicates, oxides, sulfates, carbonates, alloys, glass, biogenic material, and combustion-derived carbonaceous particles. Atmospheric PM may have a major impact on local to global climate, the cryosphere, marine and terrestrial ecosystems, agricultural productivity, and on visibility and therefore transportation systems. Many of these effects are difficult to quantify, mainly because of the challenges involved in determining the physical and chemical characteristics and spatial variability of very small particles, but detailed characterization of individual particles is essential for improving our understanding of these interactions. Atmospheric PM can also affect human health, primarily through the inhalation path. Once the particles are in the respiratory system, they interact with the lung fluid and the lung tissue, thereby stimulating various types of biological and biochemical responses. The mechanisms behind these responses as well as their dependence on particle properties are still poorly known, but they have been shown to involve oxidative stress via formation of reactive oxygen species as well as the release of chemical substances that trigger and perpetuate inflammation. Additional knowledge about both the nature and the abundance of particles in human lungs and their possible role in disease development can be gained from microscopic investigations of bronchoalveolar lavage fluids, and from samples of lung tissue excised during biopsies or autopsies. This keynote presentation will provide an overview of atmospheric particles and explore their environmental and health impacts.

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