

FAST IDENTIFICATION OF SAHARAN DUST MINERAL CONTRIBUTIONS TO URBAN ATMOSPHERE USING ATR-FTIR SPECTROSCOPY

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Atmospheric particulate matter (PM) is one of the most important environmental problems due to its adverse effects on human health, building materials, atmosphere, and several components of the environment. Size segregated airborne PM have been gaining importance for having better explanation of its harmful effects, chemical compositions and origins. Inhalable airborne particles can be classified into different groups, mainly fine (PM_{2.5}) and coarse (PM_{2.5-10}) fractions, because they have specific sources and characteristics. As it is widely accepted, PM_{2.5} emissions are very risky to create chronic effects since they are small enough to penetrate into the deeper sections of human respiratory system, even into the lungs and blood. In addition, some recent studies showed that the highest association rise in respiratory symptoms (e.g., asthma) admissions correlated with the increase in PM_{2.5-10}. In recent studies, the impacts of the Saharan originated dust storm were highlighted during transitional periods in Istanbul, Turkey, but no chemical analyses were included. It is very difficult to detect and collect PM samples for Saharan contribution event in a megacity (Istanbul) atmosphere which was located significantly far from the source; it requires a prior meteorological analysis supported by transportation models. Characterization of atmospheric particles can be done by several analytical techniques including single element methods, multielement methods, spectroscopic and microscopic techniques, UV-detection or mass spectrometric detection, and single-particle analytical techniques. Previously some researchers performed FTIR based analysis on airborne aerosol samples. FTIR coupled with ATR, is a new technique developed recently and there are only few examples of recent studies, to our knowledge, which are subjected to quantification or qualification of chemicals species of aerosol samples. Main aim of this study is to use ATR-FTIR analysis method for fast identification of mineral contributions originated from a Saharan dust storm on a megacity (Istanbul) atmosphere, where the anthropogenic contributions are high. Typical differences in the spectra of background dust loads and Saharan dust storm episodes are discussed. This study has a particular importance as being one of the first attempts to qualify the contributions of Saharan dust storms over Istanbul atmosphere using ground base measurements.

Keywords: airborne metals, atmospheric chemistry, air pollution