

Chemical composition and sources of PM₁₀ and PM_{2.5} in the greater area of Volos during the LIFE+ACEPT-AIR Project

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Abstract

Daily and seasonal variation in the total elemental, organic carbon (OC) and elemental carbon (EC) content and mass of inhalable particulate matter with aerodynamic diameter less than 10 micrometers (PM₁₀) were studied in the urban area of Volos. The city of Volos is a coastal city of medium size in the Thessaly region and extends along the northern Gulf of Pagassitikos, on the east coast of Central Greece. The case of Volos is an interesting example, where in recent decades urbanization and increased industrialization have resulted in deterioration of air quality in the region. The meteorological factors play an important role in the development of air pollution, and the complex topography of Volos favors air pollution episodes. Ca, K, Fe, S and Si appeared to be the dominant elements determined, in agreement with previous findings from the greater area. Additionally, Zn, Mn and Pb exhibited relatively high concentrations compared to other urban environments, which taking into consideration their statistically significant correlation, suggests common sources with the most probable being metallurgical activities such as loading and unloading of scrap. Mg, Al, Si, Ti, Mn, Fe and Sr exhibited higher concentrations over the warm period, in both PM_{2.5} and PM₁₀ fractions. These elements are mostly crustal and their elevated concentrations during this period can be attributed to increased dust resuspension due to higher temperatures over the warm period. Finally, V, Ni, Cu, Zn, Se, Sb, Ba and Pb exhibited higher concentrations over the cold period suggesting increased anthropogenic activity such as traffic density.

Keywords: PM₁₀; organic carbon; elemental carbon; heavy metals; sources; Volos; Greece.

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