



Comparison of positive matrix factorization and chemical mass balance models for source apportionment of particulate matter in Izmir, Turkey

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Atmospheric particulate matters (PM) fractions (PM₁₀ and PM_{2.5}, aerodynamic diameter is less than 10 and 2.5 μm , respectively) were concurrently sampled between June 2004 and May 2005 at the urban and suburban atmosphere of Izmir, Turkey. The elemental compositions were determined measuring Al, Ba, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sr, V, and Zn using inductively coupled plasma-optical emission spectrometer. PM₁₀ and PM_{2.5} samples of several sources were collected and then were analyzed in terms of the same elemental composition. Positive matrix factorization (PMF) and chemical mass balance model (CMB) were applied to determine the sources of PM₁₀ and PM_{2.5} and their contribution amounts. The results of PMF and CMB were compared. The major contributors to PM were burning of fossil fuels, the traffic emissions, the mineral industries and marine salt according to the PMF results; however undetermined parts were more than 40%. On the other hand, the contributions to PM could completely be determined by CMB, and the dominant contributor is traffic with >70% at the two sites. Burning of fossil fuels, mineral industries, marine salt and natural gas burning power plant are the minor contributors. The difference of the source apportionment profiles of PMF and CMB were finally evaluated. It was concluded that the number of the studied elements and the samples might strongly determine the output of the receptor models such as PMF, whereas CMB is mainly independent from the number of samples and species.