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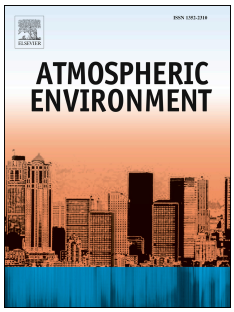

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Chemical composition and oxidative potential of atmospheric coarse particles at an industrial and urban background site in the alpine region of northern Italy

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Abstract

The chemical composition and oxidative potential (OP) of particulate matter (PM_{10}) samples were investigated at an industrial (Ala) and a background (TN) site in northern Italy. Three emission sources of airborne metals were identified by Positive Matrix Factorization (PMF) analysis, i.e., the zinc coating facility located in the area, the traffic on the nearby motorway and the pesticides normally used in the extensive vineyard cultivation. PM_{10} redox activity was measured using dithiothreitol (OP^{DTT}_V) and ascorbic acid (OP^{AA}_V) cell-free assays. Similar OP^{DTT}_V responses were obtained at the two sites (0.60±0.23 mmol min^{-1} m^{-3}), while higher (OP^{AA}_V) values were measured at Ala (1.4±1.1 nmol min^{-1} m^{-3}) than at TN (0.7±0.4 nmol min^{-1} m^{-3}). Overall, both OP^{DTT}_V and OP^{AA}_V responses were found to be broadly correlated with several inorganic species, namely ions and soluble metals, and organic components. In particular, OP^{AA}_V responses are mainly affected by Zn directly emitted from the zinc factory and Cu used in the vineyard cultivation. Therefore, the higher OP^{AA}_V values measured at Ala can be explained by the higher concentration of these metals at the industrial site.

Key words

Coarse particles PM_{10},

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