B-8

Wood combustion contribution to PM: results of five years campaigns (2005-2009) in Lombardy (Italy)

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Recent studies identify wood burning as an important source of particulate matter (PM).

In this work we present results of a 5-year PM monitoring performed in Milan as well as in other towns located in the Lombardy region to identify and quantify the wood combustion contribution using levoglucosan as a marker.

Two different approaches of source apportionment were compared, i.e. the macro-tracer method (Caseiro et al., 2009) and the Positive Matrix Factorization (Paatero and Tapper, 1994). PMF was applied to 4-hour resolved PM10 samples, collected in the Milan urban area and characterised for elemental, ionic, carbonaceous composition as well as for levoglucosan, mannosan, and galactosan.

In the literature there is still a large uncertainty on emission factors to be used in the macro-tracer approach. Indeed, a valuable apportionment should be based on emission factors considering differences in both wood and appliances used in the investigated area. In this work the macro-tracer method was applied to all dataset available using emission factors obtained by PMF after a comparison with those reported in the literature.

An average wood burning contribution to PM10 in the range 10-24 % was obtained for Milan during the different winter campaigns. Moreover, the wood burning contributed 27-43 % to OC and 23-28% to EC. A good agreement was found between PMF and macro-tracer method results.

Caseiro A., et al.; Wood burning impact on PM10 in three Austrian regions. Atmospheric Environmental 2009; 13, 43, 2189-2195

Paatero P, Tapper U. Positive Matrix Factorization: a non-negative factor model with optimal utilization of error estimates of data values. Environmetrics 1994; 5: 111-126