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1 Determination of cellulose and levoglucosan in aerosol samples

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Organic matter comprises a significant fraction of the atmospheric aerosol. Several efforts have already been taken to identify or at least characterize the composition of this fraction. Thinking of source apportionment the characterisation and quantification of organic matter is a crucial point. As exceedances of limit values of PM10 concentrations are a growing problem in several cities in Europe, source apportionment gets more and more important. Various compounds, organic and of course also inorganic species, have already been successfully identified as tracer compounds for emission sources. Here we want to focus on levoglucosan and cellulose. Levoglucosan has been identified as a tracer for wood buring (e.g. Fine et al. 2001) while cellulose can be used as a tracer for plant debris (Kunit and Puxbaum 1996).

Aerosol samples were collected in three major Austrian cities (Vienna, Graz and Salzburg). All sampling sites are backed with suburban or rural sites to allow the determination of a local background aerosol concentrations and the urban impact, produced in the various cities (Puxbaum et al. 2004). All sites are part of the local sampling networks operated by the local authorities of Vienna, Styria and Salzburg. At the present the data set comprises High Volume aerosol samples collected during January to March 2004. Sampling was performed on quarz fiber filters. Besides levoglucosan and cellulose analysis includes aerosol mass, ions (major ions and organic acids), total carbon, black carbon and organic carbon, selected organics (e.g. selected alkanes, PAHs, steranes, hopanes, fatty acids, resin acids) and trace elements. Here we

will focus on levoglucosan and cellulose analysis.

Results include concentration ranges of cellulose and levoglucosan at the various sites – pointing to posssible differences between urban and suburban or rural sites. Differences between the three cities are discussed. Furthermore cellulose and levoglucosan concentrations are compared to the organic carbon content of aerosol samples as well as to aerosol mass. Differences of this relative contribution during days with low aerosol concentrations and days with elevated concentrations are shown.

Fine et al. (2001) Chemical Characterization of fine particle emissions from Fireplace combustion of woods grown in the northeast United States. Environ. Sci. Technol. 35, 2665-2675

Kunit and Puxbaum (1996) Enzymatic cetermination of the cellulose content of atmospheric aerosols. Atmos. Environ. 30, 1233-1236

Puxbaum H., Gomiscek B., Kalina M., Bauer H., Salam A., Stopper S., Preining O. and Hauck H. (2004) A dual site study of PM2.5 and PM10 aerosol chemistry in the larger region of Vienna, Austria. Atmos. Environ. 38, 3949-3958