



Source apportionment of PM in urban and rural alpine valleys sites using different approaches

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More stringent European Union regulations of the fine aerosol mass (PM_{2.5}) will require a better knowledge of emission sources. Particulate matter (PM) are emitted by several primary sources including anthropological sources (biomass burning, fossil-fuel combustion, cooking) and natural sources (vegetative detritus, crustal dust). PM can also be formed by gas-to-particle conversion processes (secondary sources). An accurate knowledge of the relative contribution of these different sources is required in order to reduce ambient particle concentrations particularly in alpine valleys, where topographic and meteorological conditions lead to high pollutant concentrations. Source apportionment can be estimated using different approaches with off-line sampling: (1) mono-tracer methods (based on Levoglucosan and organic carbon concentrations for example), (2) the Molecular Marker - Chemical Mass Balance modeling (MM-CMB), or (3) using the isotopic carbon signature (¹⁴C).

In this context chemical characterizations and particularly a large molecular speciation of organic matter have been made on PM collected at rural and urban sites located in alpine valleys (France and Switzerland) in summer and winter seasons. The molecular speciation focuses on researches of source tracers and chemical fingerprints of large chemical families (hydrocarbons, PAHs, organic acids, saccharides, ...). About eighty compounds have been quantified. From these results, both the mono-tracer method and the MM-CMB modeling were used in order to apportion influential sources. Also, isotopic carbon data complete the chemical speciation with the determination of the modern and fossil fractions of total carbon contained in aerosols. Source apportionments obtained using the different approaches were compared in order to determine advantages and limits of each approaches. Results on the different sites are also compared to study sources in the different alpine valleys and in the different types of sites.