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Atmos. Chem. Phys., 9, 2007-2020, 2009

www.atmos-chem-phys.net/9/2007/2009/

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Carbonaceous aerosols in Norwegian urban areas

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Abstract. Little is known regarding levels and source strength of carbonaceous aerosols in Scandinavia. In the present study, ambient aerosol (PM₁₀ and PM_{2.5}) concentrations of elemental carbon (EC), organic carbon (OC), water-insoluble organic carbon (WINSOC), and water-soluble organic carbon (WSOC) are reported for a curbside site, an urban background site, and a suburban site in Norway in order to investigate their spatial and seasonal variations. Aerosol filter samples were collected using tandem filter sampling to correct for the positive sampling artefact introduced by volatile and semivolatile OC. Analyses were performed using the thermal optical transmission (TOT) instrument from Sunset Lab Inc., which corrects for charring during analysis. Finally, we estimated the relative contribution of OC from wood burning based on the samples content of levoglucosan.

Levels of EC varied by more than one order of magnitude between sites, likely due to the higher impact of vehicular traffic at the curbside and the urban background sites. In winter, the level of particulate organic carbon (OC_p) at the suburban site was equal to (for PM₁₀) or even higher (for PM_{2.5}) than the levels observed at the curbside and the urban background sites. This finding was attributed to the impact of residential wood burning at the suburban site in winter, which was confirmed by a high mean concentration of levoglucosan (407 ng m⁻³). This finding indicates that exposure to primary combustion derived OC_p could be equally high in residential areas as in a city center. It is demonstrated that OC_p from wood burning (OC_{wood}) accounted for almost all OC_p at the suburban site in winter, allowing a new estimate of the ratio TC_p/levoglucosan for both PM₁₀ and PM_{2.5}. Particulate carbonaceous material (PCM=Organic matter+Elemental matter) accounted for 46–83% of PM₁₀ at the sites studied, thus being the major fraction.

[Final Revised Paper](#) (PDF, 559 KB) [Discussion Paper](#) (ACPD)

Citation: Yttri, K. E., Dye, C., Braathen, O.-A., Simpson, D., and Steinnes, E.: Carbonaceous aerosols in Norwegian urban areas, Atmos. Chem. Phys., 9, 2007-2020, 2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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