



Past and Present Trends of Black and Brown Carbon concentrations in the Vienna urban aerosol

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The main source for brown carbon (BrC) in the European urban aerosol is biomass burning (space heating), while black carbon (BC) originates mainly from combustion in diesel engines and residential combustion. In the past decades, BC concentrations have decreased in several European cities (Kutzner et al., 2018). These changes have been attributed to policies aimed at decreasing PM emissions. In our study, we investigate seasonal and long-term changes in BC and BrC for the urban aerosol of Vienna, Austria: In 1994, 1995, 2001, 2002, and from 2014 to 2016, urban background aerosol has been sampled and collected on quartz fiber filters. The filters were analyzed for BC and BrC content using the Integrating Sphere method (Hitzenberger et al., 1996, Wonaschütz et al., 2009). Additionally, we compare our results to BC data from 1985 and 1986 (Hitzenberger, 1993). In 2014-2016, the concentration of BC has only a weak seasonal dependence, whereas in 2001 and 2002, BC concentrations show a large seasonal variability. We also show that BC concentrations have decreased over the last decades. Furthermore, for 2014-2016, the contribution of BC to PM_{2.5} shows a weak seasonal dependence, while the contribution of BrC to PM_{2.5} shows a large seasonal cycle. We demonstrate that increases in BrC/BC directly correspond to cold season heating periods. This suggests that biomass burning for space heating has a significant impact on wintertime particulate matter in Vienna.

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