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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Black carbon concentration trends in Helsinki during 1996–2005" *by* L. Järvi et al.

Anonymous Referee #2

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General:

In this manuscript, temporal behavior of black carbon (BC) concentrations in an urban area is investigated. Due to the important role of BC in both climate change and air quality issues, the research topic is certainly of common interest. I consider the manuscript original enough to warrant its publication in ACP. However, prior to acceptance, the authors should carefully address the following question and make appropriated modifications in the manuscript.

Major comments:

I am not confident about using the term "trend" in the context of this manuscript. Normally, trend calculations are made on continuous or semi-continuous time series. From

continuous time series it is possible to determine whether trends are linear or not and how significant the obtained trends are. In this paper, measurements have been made at three time periods which are separated from each other by several years. It is true that the obtained result may be indicative of trends but this is not necessary true. I strongly encourage the authors to consider modifying the title of the paper and the parts of the text where they talk about trends. As a matter of fact, the paper looks at temporal variations in BC concentrations over very different time scales (over diurnal cycle, over weekdays, between different seasons (see below), and during different years). Maybe the authors could highlight this rather than trying to detect the trends which seem to be weak anyway.

The considered "short" measurement periods P1-P4 cover basically the spring/winter part of the year. This is understandable, since no measurements over the full year are available from all the 3 campaigns. However, it would be very useful to add some information (perhaps one figure and one paragraph) on the seasonal variation of BC concentrations at Helsinki. This would help the reader to get a better overview on the temporal variability of measured BC concentrations over different time periods.

The multiple regression analysis includes two different components: 1) traffic rates, and 2) meteorological variables. It misses one important component: potential changes in emissions elsewhere. Even with exactly the same meteorology, the fraction of long-range-transported BC to Helsinki could change substantially if there were significant changes in BC sources in Europe. This fact should be brought up explicitly in the revised manuscript. In the current form of the manuscript, the role of long-range transport is mentioned in a very vague way (page 14279, lines 4-6).

Minor comments:

Formation of BC requires combustion, so it cannot be formed from biogenic sources. As a result, the statement on page 14267 (lines8-10) seems strange.

BC warms the atmosphere, but similar to greenhouse gases as stated in the text (page

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14267, lines 11-12). Contrary to greenhouse gases, BC both heats the atmosphere and cools the surface, thereby stabilizing the atmosphere and affecting potentially the hydrological cycle (see, e.g. Wang, JGR_2004, D03106; Chung and Seinfeld, JGR_2005, D11102; Reddy and Boucher, GRL_2007, L11802). Furthermore, the forcing of BC is much more local/regional that that of greenhouse gases.

There are some minor grammatical problems throughout the text. After making other revisions, the authors should carefully check out the language of the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 14265, 2007.