

Interactive comment on “Fossil fuel combustion, biomass burning and biogenic sources of fine carbonaceous aerosol in the Carpathian Basin” by Imre Salma et al.

Anonymous Referee #1

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The authors have studied the influence of different anthropogenic and biogenic particle sources and meteorology in Carpathian basin for a year. The samples were analyzed for PM_{2.5} mass, organic and elemental carbon, water-soluble OC, radiocarbon, levoglucosan and some elements. Radiocarbon-LVG marker method was applied to apportion the total carbon (TC=OC+EC) into contributions of EC and OC from fossil fuel combustion, from biomass burning and from biogenic sources. Topic is interesting and source apportionment based on in-depth chemical analysis and radiocarbon method has scientific novelty value.

General comments:

C1

-English language should be thoroughly checked by a native speaker. Especially in the introduction some sentences are a bit hard to understand.

-Chapter 2.1. It would help reader if you could name the stations in this chapter and clearly state stations called hereafter xx, zz and yy. Now there is many kind of variations of the names in the text. Maybe also include a more in-depth description of the area where stations are located (what kind of area, how many inhabitants, how much traffic/biomass burning/industry etc is in area, any prior knowledge about the expected sources?). Maybe the distance between stations or a map would help reader also. Please, add for all measured parameters the instrument, model and manufacturer. Also, it is bit hard to understand where e.g. DMPS was measuring and how long.

-Check and explain the used acronyms and terms. E.g. for elemental carbon both EC and soot are used, which can be very confusing to some of the readers. Also, terms carbonaceous aerosol, total carbon should be explained.

-More literature references should be added to the text to further discuss the results and their significance. Also more discussion about where these results could be utilized would be useful. The novelty value of results should be highlighted more!

Tables 2,3: The sampling periods for all stations are different. At the Central station the sampling period is much shorter. Are the mean/meadian values and ratios calculated for all the samples or only for the seven simultaneously collected samples? if sampling times are not exactly same, is it fair to compare the results of stations? e.g. some episode could change the concentrations and affect the observed mean values significantly.. if this episode is only included in longer timeseries measured in Background/suburban areas, this could affect the comparison when the results of different stations are compared.

Minor comments

C2

Line 35: define carbonaceous

Line 39: define soot (as there is also EC)

Line 43-51: Sentences are bit long and hard to read. Clarify this and maybe specify if these consequences in the list are positive or negative in the nature.

Line 52: "Fuel wood"? does this refer to biomass combustion in residential scale?

Line 59-61: "Huge number, composite character, spatial and temporal variability of the sources together with the complex mixture and atmospheric transformation of their products make the quantification of these source types or their inventory-based source assessment challenging" Clarify this sentence, it is bit hard to understand.

Line 62-63: "There are several methods to apportion the particulate matter (PM) mass or carbonaceous species among some or all major source types." please clarify this sentence

Lines 63-69. Sentence is really long, maybe split to 2-3 shorter sentences?

Line 74: "The latter molecule is often applied together with its stereoisomers mannosan (MAN) and galactosan (GAN) since.." maybe change to " Monosaccharide anhydride analysis often contains stereoisomers mannosan (MAN) and galactosan (GAN) in addition to levoglucosan since..

Line 100: what is the "latter type" referring to? please clarify

Table 1. Why there is extra space between date and month as well as between the month and year in all timeperiods? please check the journal instructions how to give the dates..

Lines 152-167: Please add the model and manufacturer for all the instruments, provide the instrument information for the meteorological data as well information in which stations these instruments were used. E.g. was DMPS run in all stations constantly, or was one dmeps moved between the stations? Maybe a table with station, instruments,

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models and measured components would help reader to understand the situation.

Line 169: Add balance model and manufacturer

Line 173: where does this LOQ value for PM mass comes from?

Line 198: what is origin of the LVG observed in the blank filters? please add how much levoglucosan was observed in the blanks.. has this kind of blank values seen in other studies?

Line 203: which days?

Line 236-240: "Whenever it was possible, the comparisons of atmospheric concentration, other variables or their ratios with respect to sites or seasons were accomplished by calculating first the ratios on a sample-by-sample or day-by-day basis and then by averaging these individual ratios for the subset under consideration". Please explain what variables/ratios this refers to?

Line 275: Maybe add some values for average temperature, wind etc meteorological parameters to article also (not only supplement) as people not living in Budapest may not know the normal local conditions mean.

Line 284-286: "The former variable represents the bulk fine PM; EC is a typical primary aerosol constituent, while WSOC is expresses the SOA." Sentence is hard to understand, please clarify what this means.

Chapters 3.2-3.6 please add some numerical values to text also. Would be also useful to compare more to literature whether the values were as expected or maybe lower/higher..

Line 391-395: maybe this information should be in experimental chapter?

Line 359-365; "These can be explained by larger intensity of soot emissions from incomplete burning (road vehicles, residential heating and cooking by solid fuel), which is a typical anthropogenic source, and which is associated with seasonal variation (e.g.

C4

due to residential heating) as well as with constant sources (e.g. due to traffic or cooking) over a year.” what is the seasonal variation observed for road vehicles? how they differ from traffic that does not have seasonal variation?

Line 501-502: Did temperature have similar trend as OCbio? I would have expected to see highest OCbio concentrations in summer.. or is there a reason why autumn OCbio was higher? how does this observation compare to other studies?

Chapter 3.6 and conclusions: the impact of results is now discussed from the air quality point of view. Maybe add something about climate and health point of view also? assumably the anthropogenic emissions and BC have different, likely more negative health impacts. BC has also strong climate impact..

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