Atmospheric Chemistry and Physics Discussions

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Comment on acp-2022-103

Anonymous Referee #2

Referee comment on "Enviro-HIRLAM model estimates of elevated black carbon pollution over Ukraine resulted from forest fires" by Mykhailo Savenets et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-103-RC2, 2022

The authors estimated the elevated black carbon (BC) levels in temporal and three-dimensional spatial scales after the forest fire events occurred in summer 2010 at the center of the European territory of Russia. Throughout the manuscript, the writing, however, appears somewhat rambling, especially for the 'Results and discussion" section. The authors should give more discussion and interpretation for their results. The authors need to explain exactly what the novel insights of their work are, and how their finding are relevant to atmospheric chemistry and radiative transfer. Especially compared with the earlier works that investigated the forest fire events occurred in summer 2010, the authors could state what questions had been left open, and what the present paper now addresses.

General Comments:

The authors claimed that the work focused on the horizontal and vertical variability of BC concentrations over Ukraine during a wildfire episode in August 2010. However, the author just presented the BC concentrations after the forest fire evens, not comparing with BC levels before the wildfire evens; how to demonstrate that the BC levels were elevated? Additionally, the authors should valid their simulations of BC concentrations. Could they provide some BC measurements rather than dust observations to verify their simulations, and discussed the uncertainties of the simulations. The authors claimed that the features of BC distributions that they presented in this work not only resulted from biomass burning, but also were affected by the local sources of fires. Could they estimate how much the influence?

Specific comments:

Overall, the paper is rather poorly written with many grammar/ formatting mistakes. Some simple things, such as the superscripts and subscripts of "PM10" "PM2.5" and "μg/m3" (several times), inconsistent format of the figure legends (font size and line space (caring Figure 1), font bold (caring Figure 2)). These mistakes indicate that proper care was not taken to proofread the paper prior to submission.

Figure 2 is from the Climate Forecast System (CFS) Reanalysis (source: www.wetterzentrale.de). It can be shown in the Supporting Information.

The “3.1 Synoptic weather situation during summer 2010 in Ukraine” just has one paragraph, which can be combined with the “3.2 Dispersion of wildfire emissions”.

Page 7 /Line 160-164: The authors discussed the horizontal distribution of BC concentrations not only in the accumulation mode but also in the coarse mode. However, the authors only showed the BC distribution in the accumulation mode in Figure 3. Why not present the simulations of coarse mode.

Page 9 /Line 195: The authors highlighted that the elevated BC concentrations were detected at 590 hPa (for the coarse mode) and at 550 hPa (for the accumulation mode). However, Figure 5 shows that the BC concentrations were very low with values near 0 in the <650 hPa layers. Could the authors clear how they identify the elevated BC concentrations at 590 hPa (for the coarse mode) and at 550 hPa (for the accumulation mode).

Page 10 /Line 219-225: This paragraph introduced how to process the ground-based dust measurements. It should be in the “Data and methods” rather than the “Results and discussion”.

Page 11 /Line 239-241: The two sentences are confusing and needs to be reworded.

Page 12 /Line 255-259: The authors discussed the “trails” of the BC distribution in the coarse mode, attributing to atmospheric transport and the impact of local fires. Why the BC distribution in accumulation mode did not present “trail” feature. How the effects of the atmospheric transport and local fires on the BC distribution in the accumulation mode?

Conclusions: The authors need to clear the novel insights of their work and the significance of their finding.