

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2021-947

Anonymous Referee #2

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Referee comment on "Measurement report: The importance of biomass burning in light extinction and direct radiative effect of urban aerosol during the COVID-19 lockdown in Xi'an, China" by Jie Tian et al., Atmos. Chem. Phys. Discuss.,  
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This work analyzes the impact of the COVID-19 lockdown in China on some atmospheric properties, in particular on the extinction, scattering and absorbing coefficients together with the direct radiative effect, all of them considering the aerosol chemical composition. The topic is clearly in the scope of Atmospheric Chemistry and Physics, and absolutely relevant for the scientific community and decision-makers. The manuscript is very well written, with only few typos.

My main concerns (general comments) are three:

- Title does not reflect the actual content of the work. The current title is quite ambiguous, leading the reader to expect a study on the entire Chinese territory. I suggest to explicit that the analysis focuses on the study case in Xi'an.
- the sampling campaign consisted of two distinct periods, the so-called normal period (1 to 23 January, 2020) and COVID-19 lockdown period (27 January to 7 February, 2020). Because the aim of the study is to compare the atmosphere during lockdown period against the 'normal' conditions, I consider the normal period chosen here inappropriate. Would it not be more correct to compare with the historical period 27 January 7 February (i.e. average of several years to minimize the effect of different meteorological conditions)?
- there are a lot of figures as supplementary material. Please considered to move some of them to the main manuscript. I suggest to include figures S8, S9 and S13.

Specific comments:

Line 15: replace 'optical properties of aerosol' by 'aerosol optical properties'.

Lines 39-40: Specify that this sentence refers only to China or include other references with studies worldwide (e.g. Ibrahim et al., 2021).

*Ibrahim, S., Landa, M., Pešek, O., Pavelka, K., & Halounova, L. (2021). Space-Time Machine Learning Models to Analyze COVID-19 Pandemic Lockdown Effects on Aerosol Optical Depth over Europe. Remote Sensing, 13(15), 3027.*

Line 112: justify the selection of the factor 2.14.

Line 118: please, discuss about the extinction coefficient uncertainty considering the two different wavelengths for scattering and absorption coefficients.

Line 135: why to use relative humidity if temperature and dew point include the information of moisture content? Is not redundant? I miss some important and basic meteorological variables such are radiation-related ones. Is there any argument for not to include them? Also, replace 'pressures' by 'pressure'. And a last comment on this sentence. PBLH is retrieved from GDAS data. Which is the method applied to retrieve these values? What is the spatial grid used in these computations?

Line 181: what is the advantage of using SBDART instead of other shortwave radiative models such as libRadtran?

Line 644: 100 times is missing in this definition of 'change ratio'.