

Interactive comment on “Changes in China’s anthropogenic emissions during the COVID-19 pandemic” by Bo Zheng et al.

Anonymous Referee #1

Received and published: 7 January 2021

The authors develop a simple method based on the most recent statistical data for estimating the anthropogenic emissions of air pollutants in China during the period from January to August in 2020. They report for the first time the changes in air pollutants emissions caused by the COVID-19 lockdowns in China using a bottom-up approach. Additionally, the relative changes in monthly emissions from 2019 to 2020 are compared with the satellite and ground-based observations. The emission datasets developed in this study provide essential and important information for the analysis of the COVID-19 pandemic in China.

Consequently, the contents of this manuscript and datasets developed in this study are suitable for “Earth System Science Data”. However, there are some points which should be analyzed and clarified. The reviewer recommends the acceptance of this

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manuscript after minor revisions.

(Major comments) (1) Lines 100-112: To what extent can the simple method developed in this study reproduces the changes of emissions in the past years? For example, by comparing with the MEIC in the emission changes from 2018 to 2019, it might be possible to validate the method and estimate its uncertainties. Such analysis should be added for identifying the application of the method to other cases and other regions.

(2) Figure 4: Some differences among six pollutants are found in the industrial emissions. The values for CO and NMVOCs are small positive in January and May to August while the values for SO₂, NO_x, and BC are negative in the same period and the value for PM_{2.5} is positive in January only. These differences should be discussed.

(3) Figure 5: In January, there are big differences between emissions and observations for SO₂ and NO_x while their differences for CO and PM_{2.5} are smaller. The authors should discuss the reasons more carefully. The regional background largely affected the observed CO as the authors pointed out in lines 227-229. However, it is surprising that the differences between emissions and observations are relatively small in Figure 5(c). Further discussion is needed.

(Minor comments) (1) Lines 118-120: Is there no observation data of NMVOC or NMHC concentration in China?

(2) Line 128: For NMVOC (and NO_x), the emission declining from January to August seems to be not found in Figure 1.

(3) Line 210: Is “surface emissions” correct?

(4) Lines 226-229: It looks like small differences between emissions and observations in Figure 5d. If the effects of regional background are large, the differences may be more increasing.

(5) Figure 1: It’s better that the monthly emissions are decomposed into source sectors like Figure 4.

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