

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

### **Anonymous Referee #2**

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Zheng et al. (2020) developed a bottom-up approach to estimate anthropogenic emissions over mainland China during and after covid-19 lockdown. The results suggest the reduced anthropogenic emissions due to covid-19 lockdown are mainly from industry and transportation sectors. Despite all the merits of this approach mentioned in the manuscript, the emission estimates need thoroughly evaluated to better support the conclusion. Therefore, the reviewer recommends a major revision before accepted for publication.

General comments:

In this work, changes in the emission are evaluated against changes in surface observations and satellite retrievals. However, the changes in the surface concentrations do not necessarily reflect the similar changes in the emission. There are many pro-

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cesses/factors that could affect surface concentrations. This kind of evaluation does not provide much information on the uncertainty of the emission estimates. As mentioned in the manuscript, meteorology plays a significant role on surface concentrations, which is not considered in this work. A better way to evaluate the emission estimates would be comparing surface concentrations from an emission-driven model simulation with surface observations. It would be interesting to see a combination of a top-down approach (via observational constraints) and a bottom-up approach (used in this work) to better assess the emission estimates and to add more value to this work.

Specific comments:

Page 3, line 75-76, are the emissions from cooking included in residential sector?

Page 3, line 89-94, does EF2019/EF2018 have monthly variability? Or should EFm2019/EFm2018 be used?

Page 4, line 106-108, could you explain “assumption of no change” to “predict the 2019-to-2020 change”? Just curious, do you have estimates in cooking sources? Should be higher in 2020 than 2019?

Page 5, line 141-142, is it possible to separate the impacts from Chinese New Year and COVID lockdown? As mentioned in the manuscript, one happened in Feb 2019 and one in Jan 2020. It would be interesting to see the impacts from COVID lockdown only.

Page 6, line 178, do you have estimates for aviation emissions?

Figure 4, any explanations on higher industrial sources for CO, NMVOCs, and PM2.5, in Jan 2020 than Jan 2019?

Figure 5, see general comments.

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