Atmospheric
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Discussions

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Interactive comment on "Refined estimate of China's CO_2 emissions in spatiotemporal distributions" *by* M.-M. Liu et al.

Anonymous Referee #1

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This manuscript explores the Chinese provincial data sets to calculate the magnitude of fossil fuel and industrial carbon dioxide emissions and distribute those emissions on a 0.25 degree map. Comparisons are made with other time series and maps. Uncertainties are qualitatively discussed and for the magnitude calculation quantified.

The scientific significance of this manuscript is that it provides another look at Chinese emission both in terms of input data sets as well as spatial and temporal distribution methodologies. The results are new, but not unexpected given the different methodologies involved. Overall, the significance is rated as good.

The scientific quality of the manuscript is rated as good. There are some significant assumptions in the methodology used and the authors identify some of these. The

authors are perhaps too critical of previous studies. For example, Figure 4a shows their new magnitude calculations with uncertainty estimates. Most of the results shown are statistically similar despite differences in methodology and included sources. Another example is the comparison to CDIAC maps in which the differences between the maps are clearly explained by the differences in the new methodology and the 17-year old CDIAC methodology (section 3.2). A final example is Figure 8a comparing the new monthly methodology which takes advantage of information not available to the CDIAC monthly methodology.

The presentation quality of the manuscript is good. Suggestions for improvement are included below.

Detailed comments keyed to the manuscript:

page 17452, line 8. on monthly -> on a monthly

page 17452, line 18. And the resulting -> The resulting

page 17453, line 11. Wang et al., 2012a is not in the reference list. An a and b need to be added to the two existing Wang et al. (2012) references to agree with the text.

page 17453, line 23. impracticable -> impractical

page 17453, line 24. the governments do not report monthly fuel uses by sector. -> the provincial governments do not report monthly fuel uses by sector.

Andres et al. (2011b) did account for Chinese emissions by month at the national level.

page 17455, line 18. EFs undefined previously in text.

page 17457, line 10, 9% confidence interval. This is an unusual confidence interval to calculate. Perhaps you mean 90% or 95%?

page 17457, line 17. The annual average growth rate (AAGR) for -> The AAGR for You have already defined AAGR in the previous paragraph.

page 17458, line 10. highest annual average growth rate (AAGR) at -> highest AAGR at

page 17458, line 12. Figure 4a is called to in text prior to Figure 3b.

page 17459, line 10, The results show....

While this sentence is not incorrect as it is written, it is somewhat misleading. See the Supplementary file, Figure S2 comment below about magnitude, trend, and bias offset. You may want to write a more balanced sentence here.

page 17459, line 28. Mongolia are becoming -> Mongolia is becoming

page 17461, line 2. in CDIAC. As -> in CDIAC and our distributions (where population is used as the spatial proxy, see Figure 1). As

page 17463, line 19. Wang et al., 2012 is not in the reference list. An a and b need to be added to the two existing Wang et al. (2012) references to agree with the text.

page 17470, Figure 1. OEC and TEC undefined previously in text.

page 17473, Figure 4a. It is good that you explicitly included your 90% confidence interval here. With the uncertainties for your new data set explicitly shown, one can more clearly see that the global approaches taken by IEA, US-EIA, CDIAC, and PBL and the national approaches taken by Guan and Zhao are in relatively good agreement with each other, both in trends and magnitude. This agreement occurs despite differences in methodologies and exact sources included in each data set.

page 17473, Figure 4b. The thin and purple Zhao line is too close in appearance to the thicker and purple Guan line to easily discriminate between them. Please change one of them.

page 17478, Figure 9, (compared to 25 %). I do not understand the parenthetical element and it is not explained in the text.

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Supplementary file, Figure S2. While the data derived here seem to lie closer to the monitoring data curve than the CDIAC curve for much, but not all, of the time (as stated in the text), what surprises me more is that the data derived here more closely match the CDIAC curve, both in magnitude and monthly trend than either do the monitoring curve. This magnitude and temporal match were achieved despite the relatively more detailed statistics used to derive the data derived here than those used for CDIAC. That the concentration curve constructed from the data set derived here is greater in magnitude than the concentration curve constructed from the CDIAC data is not a surprise since the data derived here includes sources that CDIAC does not (see also your fig. 4a.). This explains the "closeness" of the two curves relative to the monitoring curve. When the monitoring curve is greater in magnitude that the other two curves, the data derived here are closer to it. When the monitoring curve is less in magnitude that the other two curves, the CDIAC curve is closer to it. The results here seem to be more of a bias offset than anything else. I suspect that if your confidence interval was propagated through this same calculation, you might not see any statistical difference between your data derived here and the CDIAC data.

Supplementary file, Figure S3. Your discussion of this figure is mostly about year 2000 emissions in three areas. It would be most useful if those areas were explicitly labeled in Figure 3a and Figure 3b could be deleted as it is not called in the present text.

Supplementary file, Table S1. Coke Oyen Gas -> Coke Oven Gas

Supplementary file, Table S1. Many reference s given here, but they are not listed in a supplementary reference section.

Supplementary file, Table S4. Superscripts on three of the column titles are not explained elsewhere on the page.

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