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Atmospheric Chemistry and Physics Discussions

Interactive comment on "CO_2 and its correlation with CO at a rural site near Beijing: implications for combustion efficiency in China" *by* Y. Wang et al.

Anonymous Referee #1

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REVIEW ON Atmos. Chem. Phys. Discuss., 10, 12665–12712, 2010 www.atmos-chem-phys-discuss.net/10/12665/2010/ doi:10.5194/acpd-10-12665-2010 CO2 and its correlation with CO at a rural site near Beijing: implications for combustion efficiency in China written by Y. Wang1, J. W. Munger2, S. Xu1, M. B. McElroy2, J. Hao1, C. P. Nielsen3, and H. Ma1

GENERAL COMMENTS

This paper from Wang et al represents a very interesting study on atmospheric CO2 monitoring and CO2 emissions in China. The paper focuses on observed trends in CO2 concentration between 2004 and 2008 in the region of Beijing and presents a CO2/CO correlation study, inferring information on combustion efficiency in China. Information is also extracted from the data on CO2 emission reduction during the Olympic Games in 2008. The topic is highly relevant and in the scope of the journal, and the method used are very interesting especially when the authors try to separate anthropogenic CO2 from background CO2. The title of the paper reflects the content of this latter. The abstract gives a concise summary. However, the authors do not compare their results to former studies. Also, the paper lacks information on the data precision, on station location and does not provide the CO time series used for the study. I strongly recommend the paper for publication in ACP after minor revisions detailed in the following, especially I underline the need for a map showing the station location and altitude, the need to show the CO timeseries, the need to give the data precision for CO2 and CO, and the need to compare the results to previous studies.

——————————— SPECIFIC COMMENTS

p.12666 Line 6: Better precise what means binned by local time Line 7: replace Seasons=>season Line 11: precise what upwind what Line 15-17: Also give information on CO2 increase evolution year to year Line 24: replace levels=>level Line 24 and 25 contain the word "increasing" twice, change one p.12667 Line 2: replace increases=>increase, are=>is Line 4: replace are=>is, remove the p.12668 Although a map of the stations has been published in another paper, readers get quickly lost when the authors describe the station locations. It seems to me mandatory to add a general map that will present all the stations cited in the paper (including Mauna Loa) and their altitude using a color palet for example. It would be useful to add geographical information, such as the Qinghai-Tibetan plateau location (cited p.12678) or any other specific geographical feature cited in the paper. p.12669 Line 16: Any more recent paper than Bishop et al. (1996)? Line 25 and on p.12670 line 1-22: the paper sections are not very

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Interactive Comment

well presented and the text could be better organized: goals and information are too much mixed. Line 24: Give the altitude of Miyun station, describe more in details Beijing (population, main activities, main pollution sources according to seasons). p.12671 Line 4: replace county by country Globally in this section it is mandatory to give the data precision for CO2 and CO. p.12674 Fig. 3b is not explained! This section is very interesting. The authors could go further by calculating the evolution of the rate from one year to the other (18/8=2.45 from Gregg et al, 2008 against 4/1.4=2.85 from your observations, which is quite comparable). Compare your results to the references you gave (ex. the average rate of increase from your observations is 2.7ppm/year, and is thus similar to the one reported by Cho et al. 2007). You should mention that you use all the dataset here and will later on distinguish night and afternoon data. Line 11: FTT study - explain better why point window 13 is selected rather that point 1. p.12675 You need to show the CO timeseries! Line 5-12: give references Line 11: replace "showing the data for 2007 and 2008" by 2007 and 2008 data Line 12: what are the uncertainty values? p.12676 Line 18: here you define the correlation coefficient as R, elsewhere it is R2. Please correct this in the whole paper (text, figures and tables). p.12678 Line 10: remove the coma after the point. p.12679 Lines 10-16: you can go further by computing ratios (8/3.2 and 2.7/1.6) and comparing them. Line 27: give lifetime values p.12680 Line 4: the term "space heating" is not very clear to me (maybe should replace by indoor heating?) Line 14: explain what is p Line 25: any comment on the fact that a larger dispersion is observed for higher CO concentrations? p.12681 Line 20: a reference is needed on the low combustion efficiency from local sources, otherwise the argumentation is not convincing. p.12682 Line 14: precise what is Siberian High Line 16: the differences between the wind sectors are not obvious, indeed. p.12683 Line 1: what is the PBL height? p.12684 Line 19 etc: remove [] and () p.12685 Line 1: replace have by has Again, it is necessary to show the CO timeseries. p.12689 Line 22: give distance between Miyun and UUM. p.12690 Line 6: replace decreases by decrease. The sentence is confusing, please rewrite it. Comment: 2.7/1.7=1.58 ie 58% more, is this comparable to inventories? Quantify. Also, compare to references (and comment

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referring to the -20% target).

Acknowledgements Acknowledgements, with a s at the end.

Tables Table 1: Column headers should be simplier (such as 2005, 2006, 2007 and 2008) Table 2: Better arrange column size versus title size

Figures Fig.1: -Replace system by set-up -Avoid unexplained acronyms such as MFC Fig.2: -Very nice figure indeed but y-axis is false, and a label for the x-axis is missing. Fig.3: Lack a map showing stations location, even if given in a former paper, especially for WLG, UUM and TAP. Altitudes of the stations should be given on the map (use a color palet for example). Estimated background comment could be clearer Fig. 4: Caption=> lines are FFT13 and FFT52 are "private cooking": use more general terms to explain your work Fig.5: Why did you use only one year to conduct this study? Make an insert easier to read for slope + R2 Here the correlation factor is R2 (some other times it is R., be more rigourous on this) Explain better the reduced axis method and refer to text Fig.8: OK but indicate what the uncertainty bars represent Fig.10: Interesting approach, but hard to observe differences in the cluster area definition, it seems there is a lot of overlapping!

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