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Atmospheric Chemistry and Physics Discussions

Interactive comment on "^{14}C observations of atmospheric CO_2 at Anmyeondo GAW station, Korea: Implications for fossil fuel CO_2 and emission ratios" *by* Haeyoung Lee et al.

Anonymous Referee #1

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Review of "14C observations of atmospheric CO2 at Anmyeondo GAW station, Korea: Implications for fossil fuel CO2 and emission ratios" by Lee, H. et al. ACPDiss..

General: The manuscript discusses radiocarbon estimated fossil fuel CO2 emissions from local South Korean sources as well as from the Asian continent based on samples taken at the GAW station Anmyeondo in Korea. Additionally, they calculated the emission ratios of CO/CO2 and SF6/CO2 and draw conclusions about improved oxidation efficiency in both the Asian continent as well as Korea. They also state based on a comparison between top-down and bottom-up (inventory) methods that that there is a mismatch of estimated emissions to the point that inventory-based methods lead to up

to 1.8 times lower emissions.

The paper is well written, easy to follow and well-illustrated with graphs. I suggest publications of this manuscript after minor revision:

Minor points: L:434 In South Korea and China, atmosphere-based RCO values are 1.2 times and (1.8±0.2) times greater than in the inventory, respectively. Please add also an uncertainty for the Korean value.

L: 38 the CO2 increase rate seems very high to me with a large uncertainty, 2.4+-0.5 ppm

L: 56 . . ., since those (not clear what you mean here, I guess CO2)

L:82-83 Why was the station location changed between the previous and the present study?

L:126-127: what about permeation problems associated with glass flasks? To which pressure are the flasks filled? Under which conditions are the flask stored until measurement take place? How long does it take to be analysed?

L:164-166: It might be worthwhile to give a upper limit estimate for this influence. Maybe, also CO2 flux values for the Yellow and Japanese Sea would be helpful for the reader to underpin your conclusion.

Eq. 4-6 I guess these equations are well-known and not necessary to be shown again. I would skip it and only reference on a paper describing this or to the software tool that you have used to calculate the regressions.

L:309-310 This is an important issue to be discussed in more detail, since this relevant with the conclusions drawn from the data about Asian emissions.

L:314 what about correlation between SF6 and CO?

L: 337 what about a contamination from the local SF6 emissions on the ratio assigned

to the Asian continent? Could you get an handle on it from SF6/CO ratios?

Fig. 2 How sensitive are the results on the selection of the background values? To use NWR as background sounds rather strange as the two stations are very far apart and the authors mention explicitly Chinese station as well. Alternatives would be a Japanese location? or a European station. Or even lower bound values of the AMY station based on Hysplit selection.

Table 1 strange that r is low for PL trajectories. Has it to do with only a few values, since there is a much larger addition of fossil fuel CO2 present.

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