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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Toward resolving the mysterious budget discrepancy of ozone-depleting CCl_4: An analysis of top-down emissions from China" *by* Sunyoung Park et al.

Anonymous Referee #2

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Park et al presented a top-down emissions estimate of CCl4 from East Asia based on high frequency surface measurements of halocarbons at the Gosan sites. This paper is timely. Results presented in this paper provide crutial pieces of information that closes the CCl4 global budget as well as providing the atmopsheric observational evidence that unported CCl4 emissions during chloromethans and PCE production. However, the writing in many places can use some improvements. I recommend the authors go through the entire manuscript thoroughly to improve the clarity and accuracy. The paper should be published in ACP after the following comments are addressed.

P1 L15, "the 2010" -> "a 2010" 2. P2 L5-7. You should state that the global top-down

emissions are derived based on both the CCl4 lifetimes and the observed global decline rate. 3. P2 L9. THe global emissions number from Liang et al, 2014 was 39Gg/yr, not 30Gg/yr. 4. P2 L11-12. I am not sure why you say "unidentified sources and/or unreported anthropogenic emissions". CCl4 is a predominantly man-made compound, therefore the emissions sources are anthropogenic. 5. In many places, need to change the "," after the references to ";". 6. P2 L27-30. You need to merge these two sentences and present the results from these studies in a less confusing way with a correct referencing style. In the present form, it is hard for the readers to figure out from which studies the 4.3 and 5.2 Gg/yr were from. 7. P2 L30. Change to "8-year continuous high frequency, high precision atmospheric CCl4 concentrations measured . . ." 8. P3 L2. Change "below the " to "to the south of .." 9. P3 L7. I am not sure what do you mean by "well situated to allow monitoring of long-range transport from the surrounding region". Is this because of elevation or it is in remote clean ocean? By surrounding region, what regions are you referring to? China? The Korean Peninsula? Please clarify. 10. P3 L10. Please include the actual values than just say "high-precision and high-frequency" 11. P3 L22. You need to define what do you mean by "baseline values". This is jargon. 12. P4 L6-7. It would be good to add references here. 13. P7 L11. It is interesting that CFC-11 showed up in the source factor. Does this indicate that CFC-11 is also produced in the CM plants? 14. P7. It will be of great value to CCl4 source identification to link the discussions in the source factors to the industrial production, usage, and potential emissions pathway in Sherry et al. (2017). Such a discussion will help to build link from bottom-up inventory-based estimate to atmospheric observation based top-down estimate. 15. Figure 3 and related discussions. (1) I wonder if part of the difference between the Vollmer et al., 2009 and this study is due to the location of Gosan vs. Shandianzi. The location of Gosan captures most of the outflow from the industrial central and south China, where all the CCl4 production industries are located (as suggested by Figure 2), while Shandianzi captures mostly the air influenced by N. China, without much CM production. Should consider add a related discussion on this in the manuscript. (2) The covariance of CFC-11 and CMs (source factor 2) is

very interesting. Does this mean CFC-11 is also an intendended by-product during the industrial process and the recent increase in CFC-11 unreported emissions (Montzka et al. 2018) is to some extent linked to the CCl4 emissions increase in China between 2012-2016?

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