

Interactive comment on “The effect of systematic measurement errors on atmospheric CO₂ inversions: a quantitative assessment” by C. Rödenbeck et al.

Anonymous Referee #2

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This paper by Rodenbeck et al. addresses the issue of merging different networks or different measurement techniques while performing atmospheric inversion. This question has been raised by several authors in the past but qualitatively most of the time. It is an important question because errors associated to merging networks or measurements technique are most of the time systematic errors, evolving with time, that are hardly compatible with inverse schemes that suppose random errors. This paper proposes a quantitative assessment of the question, which makes it original. This topic had to be treated and the paper does it properly to my opinion. I find the paper well presented with clear figures, although some clarification are needed in the

text. I do not have major concerns on the paper but only minor points in the text that are detailed below. I recommend the paper for publication in ACP after answering the following comments:

P8981 - line 13 : “Also \checkmark different results” the sentence is ambiguous because the use of prior (quoted before in the paragraph) is also a regularization method. Please clarify.

P8982 - line 8 : “So far \checkmark uncorrelated” : Although not the main topic of the paper it should be quoted that recent development in inversions uses correlations in the flux space.

P8984 - line 12 : How sensitive are the results to the type of smoothing done ? As can be seen on the figures, the smoothing applied removes largest differences. Did you try to change the low pass filter frequency ? How does it affect the results ?

P8984 - line 28 : please clarify the weighting applied to the data. How sensitive are your results to this weighting ?

P8983 = end : the authors should precise more clearly that they invert differences and not full concentrations

P8986 - line 17 : how do you add the varying difference ? I suppose that the sign is changed when applying to one network and the other ? Please clarify this point.

P8989 - line 23 : the authors should reinforce the important conclusion that when moving to high frequency observations, measurement differences might become larger, as other types of error such as transport error !. This indicates that the results of this paper may be robust to the evolution of inversion techniques, as long as regular inter-comparison between networks and techniques maintain a good knowledge of difference evolution.

Figure 4 : your “global flux” presents significant differences whereas it should reflect mass balance of CO₂. Can you comment on that ?

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