

Interactive comment on “Improvement of the retrieval used for Karlsruhe TCCON data” by M. Kiel et al.

Anonymous Referee #2

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The paper describes an improvement of the retrieval methods for solar absorption spectra, measured by TCCON sites. Originally TCCON concentrated on measurements of the long-lived greenhouse gases, like CO₂ and CH₄. These measurements require the highest possible precision and a low bias between different sites. Kiel et al. now increased the spectral range from the N-IR to the MID-IR by using a dichroic beam splitter and an InSb detector instead of using an extended InGaAs diode. The dichroic causes large variations in the continuum level, which need to be considered in the retrieval to keep the high precision requirements of TCCON. The whole study is performed for the Karlsruhe TCCON site.

Overall the paper is appropriate for AMT, but I have a few major comments.

The paper could be shortened. Many details are well known or described by others.

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Describing all details, and repeating what is already published causes the danger that the paper will not be read by others.

Page 2, line 19: It is not necessary to mention in the abstract that the new Karlsruhe data are available through CDIAC. The paper should concentrate on the general retrieval technique and not highlight the results from one site.

Page 6, line 8: The spectra measured by the Si-diode are also necessary to study aerosols, and the oxygen band is necessary for comparison with satellites, which cannot use the oxygen band at 7885 cm⁻¹.

Page 11, line 18 and Fig. 7 and 8. This chapter gives the impression as if this kind of plot is first published here. This is wrong, the correlation plots have been shown and discussed already in detail by others (e.g. Wunch et al., Geibel et al., Messerschmidt et al). Therefore it is not correct to write that: Numerous CO₂ in-situ profiles were obtained via instruments on an aircraft and compared to CO₂ column amounts from TCCON spectrometers. Further details and instrument descriptions are given in Messerschmidt et al. (2011) and Geibel et al. (2012). The results from Kiel et al. yield an update of what has been done before.

Page 16, line 15: Co-authors should not show up in the acknowledgement. Delete either as co-author or in the acknowledgment.

Minor comments:

I am not sure whether tables 1, 3 and 4 are necessary. The results depend on the specific instrumental set-up, and will not help other groups if they plan to perform this kind of strategy.

Figure 2-4: The three Figures can be summarized in one.

Figure 5 -6: One Figure showing the differences is sufficient

Figure 7-8: One Figure is enough. See also my comment above, the caption is not

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acceptable.

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