

## ***Interactive comment on “Carbon monoxide mixing ratios over Oklahoma between 2002 and 2009 retrieved from Atmospheric Emitted Radiance Interferometer spectra” by L. Yurganov et al.***

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First of all, we express our appreciation to both reviewers for their important and valuable ideas for improving our manuscript.

Final Reply to Reviewer #1

Error analysis. We focused on errors connected with H<sub>2</sub>O uncertainties and the influence of aerosol/thin clouds. In the revised version a special section “Summary of errors” will be included, where the entire error estimate will be justified. He et al. (2000) analyzed 3 days of March 1998 with surface temperature  $-5 \sim +15$  C, i.e., for low humidity. His estimate “less than 5%” refers to that data set. Our analysis is based

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on almost 7 years of measurements and includes cases with high water vapor content.

Our decision to scale AERI-derived H<sub>2</sub>O is based on several cases with PWV  $\sim$  4 cm (an example is Fig. 4). Close to 9:00 UTC there is a difference in PWV between AERI and MWR  $\sim$  1.5 cm. This results in a 30-ppb change in CO. For PWV < 3 cm an agreement between AERI and MWR is better (Fig. 3b), and scaling improves AERI CO retrievals not so dramatically. However, there is a tendency for overestimation of PWV by AERI (Fig. 3b) for high humidity.

Solar radiation correction. We recognize that the solar radiation influence deserves more attention. Retrieved CO correlates with RD. RD characterizes radiance that is not taken by the current version of kCARTA into account. First of all solar scattered radiance around noon should be taken into account. Second example is thermal radiance from aerosol and thin layers. Fig. 6 illustrates both a correlation between CO and RD, different slopes of this correlation is apparent. Most probably these different slopes are due to different aerosol parameters and/or cloud parameters. Unfortunately at this moment we have no funds and facilities to continue this work. A search for funds takes some time. Reviewer #1 proposes to include this dependence in the error. We do not agree with him completely. We tried to account for this effect in the v.2 of results, but the problem has not been resolved to the end. But even a partial correction is better than nothing. We hope that our study will be helpful for further retrieval efforts.

Specific comments. P. 1265. The text will be quoted in the revised version; the SGP and ARM are described on the website exhaustively. Abstract. It will be rewritten. P.1267, l.4 . We agree. P.1267, l.25 – p.1268,l.4. We will give more explanations. P.1268, l.3. We will give more details about this new routine. P.1268, l.21. We agree. P.1269, l.8. We believe that a more detailed consideration should be given in a special section (see above). P.1269, l.10. Again, this will be discussed in the special error section. P.1270, l.14-15. It will be done. P.1279, l.19. The text will be changed according to the reviewer's remark. P.1269, l.20. As we already mentioned, a new section devoted to errors will be added and these sources of errors will be estimated.

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Technical corrections.

Acronyms will be defined. Superscripts and subscripts will be used where necessary. Section 2 will be reorganized. In particular all the error issues will be moved into a special section. A discussion of ongoing research will be moved to the conclusion section. P.1264 , l.176 (The reviewer most likely means “l.17). We will rewrite the abstract as he proposed above. Yes, we agree that the discussion of the various algorithms should be placed in the error section. P.1266 , l.1-9 We will rewrite this paragraph. P.1268 , l.6-20. The number of topics will be made fewer. P.1271 , l.26. The typo will be corrected P.1280 , l.1-3. This sentence will be moved into the error section in a rephrased form. P.1283 , l.14. The typo will be corrected P. 1296, Fig.7 caption. The sentence will be made clearer. P.1268 , l.13. Turner et al. was published in 2000. Figure 8. “Convolved” looks as spelled correctly.

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