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Atmospheric Chemistry and Physics Discussions

Interactive comment on "CO at 40–80 km above Kiruna observed by the ground-based microwave radiometer KIMRA and simulated by the whole atmosphere community climate model" *by* C. G. Hoffmann et al.

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The manuscript describes ground-based measurements of middle atmospheric CO over Kiruna and compares it with satellite- and model data. The paper is well written and highlights consistencies as well as discrepancies between the two remote sensing instruments and the model. The paper meets the quality standards of Atmospheric Chemistry and Physics. However, to make it more interesting I suggest the authors add some more information and figures to the article. I primarily suggest to give more details about KIMRA (measurement technique, frequency) and show more than just

one altitude of the CO time series.

Comments on figures:

Figure 1: I agree with Hugh Pumphrey's comment. The figure on the right does not add any new information and an extended vertical axis would show the reader why you focus on the 40-80 km range.

Figure 5: Not absolutely necessary since it is a summary of Fig 4. I suggest using a different set up in Fig. 4 to underline the difference in correlation in HF (middle column) so that Fig 5 can be omitted. You could for instance show the plots in three rows instead of three colums to enhance the x-axis.

New Figure: I suggest that you show the time series of the data over the whole altitude range from 40-80 km instead of showing just one altitude (Fig 3). This might add to a scientific understanding of the discrepancies between the instruments at certain altitudes. I suggest using a contour or color plot for all three data sources using for instance only the Low Frequency time series since they correlate best.

Minor comments for the text:

P. 561, line 15: If the SSW is a final warming the vortex is not reestablished and summer-like conditions persist. I suggest to rephrase the sentence.

P. 563, line 25: I would like to get a few more details about KIMRA. Information like microwave radiometer which measures a pressure broadened spectral line of CO at 230 GHz, the viewing angle and calibration method. Just a few sentences would be good.

P. 564, line 8: What apriori profile do you use? Is it always the same or do you adapt throughout the year? Is it a climatological profile or do you use recent MLS measurements?

P. 564, line 27: "which should be close to one". Could you clarify this sentence in a

way that it becomes clearer that the measurement can be more trusted and is almost independent of the apriori if the area is close to one.

P. 565, line 2ff: See comment on Figure 1. Furthermore could you comment on the sentence, that the sensitivity usually deviates from one. Is this bad or good? It needs some clarification as well as the description of the minima and maxima. Is Figure 1 representative of a single retrieval or is it the average over the investigated time period?

P. 565, line 15: "...better resolved dataset" you could add at the end of this sentence ",in our case a MLS or SD-WACCM CO profile" to make it clearer.

P. 570, line 7ff: I don't exactly understand what is Xindependent and XKimra in the equation. Could you clarify the difference between the two by adding one or two sentences?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 559, 2012.