

Corrigendum to

“First direct observation of the atmospheric CO₂ year-to-year increase from space” published in Atmos. Chem. Phys., 7, 4249–4256, 2007

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After the ACPD open review process and after our manuscript Buchwitz et al. (2007), entitled “First direct observation of the atmospheric CO₂ year-to-year increase from space”, appeared in ACP, we have received some relevant private communications, which we would now like to address. In summary, we conclude that we would like to refer readers of our manuscript to information given in three other manuscripts not cited in Buchwitz et al. (2007), namely Chédin et al. (2002, 2003) and Strow et al. (2006). We also conclude that the title of our paper now appears somewhat general and not sufficiently specific to atmospheric CO₂ columns. In our manuscript we report that the CO₂ annual increase has been observed indirectly already by Aumann et al. (2005) by analyzing AIRS brightness temperatures in the thermal infrared (TIR) spectral region. We have used the term indirectly because Aumann et al. (2005) is not focussing on CO₂ retrieval but on the sensitivity of AIRS temperature measurements to CO₂ variability, including CO₂ trends. We were not aware of results shown in other relevant manuscripts also discussing mid tropospheric CO₂ trends using satellite measurements in the TIR spectral region, namely Chédin et al. (2002, 2003) using HIRS and Strow et al. (2006) using AIRS. In the following we would like to shortly discuss the results presented in these manuscripts focussing on aspects related to the interpretation of the title of our manuscript. As written in Chédin et al. (2002) the TIR radiances in the CO₂ absorption bands “mostly depend on the temperature of the atmosphere but also on the CO₂ concentration”. In contrast, our results are based on absorption spectroscopy in the near-infrared (NIR) spectral region using reflected solar radiation, which primarily depends on CO₂ and only weakly depends on temperature. Because of this the NIR CO₂ retrievals may be characterized as more direct but we used direct in our title primarily because of the results shown in Au-

mann et al. (2005) as explained above. In contrast to Aumann et al. (2005), Chédin et al. (2002, 2003) are not focussing on temperature but on CO₂ retrieval and they show in both manuscripts that the annual CO₂ increase in the tropical middle troposphere can be retrieved from HIRS TIR radiances. Because of the strong temperature dependence of the HIRS TIR radiances atmospheric temperature variability has to be constrained. This is accomplished in Chédin et al. (2002) by using collocated radiosonde measurements and in Chédin et al. (2003) by using MSU microwave measurements. In addition, both papers focus on the tropical region because this enables to better decorrelate CO₂ from temperature variations. Strow et al. (2006) focusses on AIRS radiances and discusses differences to radiative transfer simulations based on ECMWF temperature profiles. Apart from the different temperature sensitivities there are several other important differences between the NIR and the TIR measurements. An important difference is that the NIR measurements have nearly equal sensitivity to CO₂ concentration changes at all altitude levels, including the boundary layer, and therefore enable the retrieval of CO₂ total columns, in contrast to TIR measurements which have highest sensitivity in the middle troposphere. We refer in the title of our manuscript to atmospheric CO₂, in contrast to the mid tropospheric CO₂ observed by the TIR CO₂ retrievals, but we now think that it would have been clearer to explicitly mention in the title of our manuscript that our results refer to CO₂ columns (in our abstract this is mentioned). In conclusion, we would like to take this opportunity to cite and draw attention to the results provided in Chédin et al. (2002, 2003) and Strow et al. (2006), which we consider important examples of the use of remote sensing to understand the behavior of CO₂ in the atmosphere. Similarly we consider that one optimal way to obtain global information about CO₂ is to combine satellite NIR and TIR measurements as discussed in for example Burrows et al. (2004) for several tropospheric trace gases.

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