Atmos. Chem. Phys. Discuss., 7, S7965–S7967, 2007
www.atmos-chem-phys-discuss.net/7/S7965/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "CO measurements from the ACE-FTS satellite instrument: data analysis and validation using ground-based, airborne and spaceborne observations" *by* C. Clerbaux et al.

Anonymous Referee #1

Received and published: 23 December 2007

The ACE instrument is one of the most important satellite spectrometers currently available. The instruments yields the concentration profiles of many trace gases on a global scale. A validation of the ACE results is mandatory. The manuscript gives a validation for CO using several ground-based stations and other available satellite of aircraft data. In this respect the paper is a useful contribution, and the results should be published in ACP. In general, the comparison of the different instruments and their specific sensitivities have been performed with sufficient care, and I have only a few comments.

1. The description of the ACE mission could be shortened; details of ACE are given in many other papers. A suitable reference is sufficient.

2. I suggest that the microwave observations at Cervinia are discussed in a different chapter. Although only a few data are given for only one site, these observations should not be mixed with the FTIR data. This should also be made more clear in Table 3.

3. Table 3 should give the DOFS for a all sites, otherwise a comparison makes no sense.

4. I do not fully understand Figure 8 and 16. The reader might get the impression that ACE performs only very few measurements per year, which is not the case. If Table 3 gives for example 39 coincidences for Kiruna, I would expect 39 symbols in Figure 8, but I find only 9.

5. Figure 11 gives no ACE data for the altitude region 22-23 km. I assume the retrieval gives negative values, which is unrealistic. But I do not see any problems in negative values, as long as the error bars allow to explain these outliers. For completeness all data should be shown, and also the negative data must be included in the mathematical analysis, otherwise a positive bias of ACE could be artificially created. The high positive values around 27 km might be caused by the negative ones around 23 km. This needs to be discussed somehow.

6. Due to the large error bars it makes no sense to show MLS above 30 km in Figure 18, any comparison above 30 km is meaningless.

7. The ATMOS instrument on the space shuttle, flown in 1985 and 1994, was also as a solar absorption FTS instrument. I assume ATMOS has measured CO. If so, the results should be discussed here for comparison.

8. Page 15285 and 15286: The impact of southern hemispheric emissions and biomass burning contributions of CO on the UTLS have already been studies in detail by Notholt et al. (Notholt et al., Science, 300, 307-310, 2003) and Rinsland (Geophys. Res. Lett., 32, L20803, doi:10.1029/2005GL024214, 2005). These papers should be mentioned here. The Rinsland paper is discussed later on in a different context.

ACPD

7, S7965–S7967, 2007

9. page 15286: The impact of thermospheric and mesospheric CO on FTIR profiles an columns in the polar regions have been discussed by Kasai et al. (Adv. Space Res., 35(11), 2024–2030, doi:10.1016/j.asr.2005.04.099, 2005) and Velasco et al. (Atmos. Chem. Phys., 7, 1305–1312, 2007). Both papers should be cited here, the Velasco paper is cited already in a different context.

10. Page 15288: It is written there: ‘Until recently only total column retrievals were available, but improved retrieval algorithms now allow profiles or partial column data to be derived (Hase et al., 2004).’ This is not true, CO profiles have already been retrieved from ground-based IR spectra in 2003 (Notholt et al., Science, 300, 307-310, 2003). These results should be discussed here. Furthermore, after mentioning the paper by Hase et al. (2004) I do not understand the following sentence. ‘The quality of the CO vertical profile information extracted from ground-based FTIR solar absorption is discussed in Barret et al. (2003).’

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15277, 2007.