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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of ACE-FTS v2.2 methane profiles from the upper troposphere to lower mesosphere" *by* M. De Mazière et al.

Anonymous Referee #1

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The paper by Maziere et al gives a very comprehensive overview of ACE methane profile measurements from the upper troposphere up to the lower mesosphere. It comprises a comparison with a variety of different sensors and thereby also gives a nice overview on upper tropospheric methane retrievals in general. It is carefully written but it was sometimes difficult to read because of the sheer amount of different instruments and rather lengthy desriptions of profile comparisons.

Overall, it is a nice paper (and a nice instrument) which should be published but the authors should consider the following remarks:

general remarks After reading the paper I was wondering whether there is actually a *true* measurement to compare with. In principle, I would guess that the SPIRALE

measurements are closest to the truth and only then you could talk of a bias when comparing with ACE. In the other cases, I find the term bias misleading as it suggests one of the instruments to represent the truth. Thus, the question arises whether it can be called validation or just an intercomparison of remote sensing instruments. You should definitely reconsider when to call a difference bias and when not. Otherwise, it could in some cases discredit the wrong instrument or just give the impression that one instrument might be the benchmark.

As for the g-b FTIR stations: It is mentioned that each station has its own set of parameters (such as microwindows). Can it be assured that all stations are intercomparable or might there be a bias between stations due to a different choice of microwindows or, eg. station height? Is there a unified retrieval scheme for all stations? If not, it should be mentioned that a difference between stations might exist. Can the impact of the assumption of a simple Voigt line-shape be estimated (neglecting line mixing and eg Dicke narrowing)?. For ACE FTS measurements at heights where Doppler broadening is dominating, the errors should be less than eg for surface FTIR measurements (where errors in near surface line-shapes might bias the retrieval of upper atmospheric partial columns). I think only short explanations of these issues are necessary as the FTIR comparison is only a minor part of the paper (and it didn't give a clear picture of the ACE quality anyway).

As for MIPAS: The authors should include the statements by Manuel López-Puertas and Bernd Funke who saw a systematic discrepancy in the data and nicely traced it back to a potential physical origin.

As for the HALOE comparison: Is there any fundamental difference between HALOE and ACE besides the inclination (spectral range/resolution, choice of microwindows, spectral database, retrieval algorithm)? Due to the similarity of the instruments and the well defined light-paths in occultation mode one would expect very similar measurements (as they also seem to be but some differences remain for which it would be good to have at least an idea of the origin, like in the case of MIPAS at high altitudes).

ACPD

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Specific remarks Methane introduction: I think you could shorten the general methane budget section and refer to standard literature for details. ACE FTS retrievals: What is the reason for using different microwindows at different heights? (Is it to have an optimal line strength for each height?)

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 17975, 2007.