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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: A trace gas climatology derived from the Atmospheric Chemistry Experiment Fourier Transform Spectrometer dataset" *by* A. Jones et al.

Anonymous Referee #2

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In this manuscript Jones et al. present a climatological dataset of the middle atmosphere which has been generated for 14 atmospheric trace gases on basis of ACE-FTS measurements. For a technical note the description of the dataset is adequate since it is concise and covers all necessary information. However, the applied scheme for data selection and averaging is not convincing and needs further elaboration/explanation before publication in ACP is possible.

The central part of the paper is the description of the 'filters' which have been applied to the original dataset together with the method of calculating the mean values from the selected data. On pages 29857 and 29858 it is described that the selection criteria

are based on the data themselves. In principle a selection of data should be made on basis of other information than their values themselves (e.g. instrumental parameters indicating a problem, a bad fit of the spectra or convergence problems during the retrieval). In detail:

'**Unrealistically large or small (for example, very negative) VMRs are then removed.**'

Could you specifiy this and give examples what this means. Which limits have been set here in positive and negative direction?

'. . . **any measurement for which the fitting uncertainty is larger than retrieved value is ignored**. . .'

Why has this been done? Also from many noisy data you can get realistic results by averaging.

'. . .**any measurement with a fitting uncertainty that is smaller than 0.01% of the retrieved value is also ignored**'

The reason for this has to be explained.

'Final filtering is performed by using a statistical technique, namely the median absolute deviation (or MAD).'

Why, after all these previous steps, is a further filter necessary?

Since a climatology is the most probable state of the atmosphere for a given time and location, we must be able to remove observations that are considered non-representative of the most probable state.'

I do not agree with this reasoning. In fact, the ACE-FTS sampling is due to it's observation geometry rather sparse. If one measures even with this sparse sampling an 'unusual' profile, one could also argue that such a profile is in reality not as 'rare' as it seems through the ACE-FTS perspective. So this is not a reason to discard it.

To substantiate that the applied filters are all really necessary it would be instructive to show as an example how the climatologies differ when the selection is stepwise switched on.

Concerning the calculation of the mean of the remaining data the following is said: **'In making the climatologies, we take into account the quality of the data such that we weight each measurement by the inverse of their fitting uncertainty when calculating the mean.'**

How has this weighting been done? In an Gaussian optimal sense, by weighting each data by the inverse of the square of its precision (here called 'fitting uncertainty') or really weighting by its precision only, as the text indicates? If the latter is the case, I would question this approach unless there are good reasons for its application.

'The total number of observations per grid cell can be used in these cases to determine the degree of statistical robustness.'

It would be very instructive to show, at least for one example, in the same format as the other plots (Fig. 4-11) the number of observations entering each bin.

Technical: Fig. 10: the figure numbering (ABCD) is missing.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 29845, 2011.