

Interactive comment on “Source classification of upper tropospheric pollution by MIPAS HCN and C₂H₆ global distributions” by N. Glatthor et al.

Anonymous Referee #1

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General Comments : In general, this paper is scientifically interesting as it illustrates very well the capability of high spectral resolution infrared sounder, in particular in limb-viewing measurements, to provide information on the pollutants in the upper troposphere. Moreover, it shows (like some previous papers) despite poor geographical coverage, this kind of instrument allows studying trace gases on global scale. HCN and C₂H₆ are both important tropospheric pollutants which are respectively good tracers of biomass burning, but the latter is also an indicator of industrial pollution. The analysis of concentration variations for both species over space and time completes well their existing literature. Comparisons with measurements obtained by other instruments are well documented. The study of global distributions is also completed by backward trajectories maps and the conclusions on the main sources origins and locations seem to be consistent. In consequence, I consider the paper suitable for publication in ACP C4368

with nevertheless some minors corrections detailed below :

Specific Comments : - I think the title of this paper is not correct, it would be better to be more modest about the “source classification of upper tropospheric pollution”.

- Why measurements analyzed here covers only the period from September 2003 to March 2004? Is it due to an instrumental limitation (spectral resolution for instance) after this period? If you extend the study to 2005, 2006 and after; it would be interesting to derive also long-term trend. Moreover, comparisons with other measurements (like from ACE-FTS) would be more significant.

- There is a little description on how the retrievals are derived. Consequently, it is hard to understand why the “additional interfering species” are not fitted and what is their impact on the total error (Fig. 1). Moreover, there is no Figure of observed spectrum with, for instance, molecule by molecule simulations for the spectral windows used for HCN and C₂H₆ retrievals. In consequence, it is challenging to see how interfere the other species which are taken into account (fitted or not).

- It is not clear for me why the vertical resolution is significantly better in lower and middle stratosphere.

-Since Figure 3 is not really discussed (for instance HCN above Tibet, or C₂H₆ Hot Spots in Northern hemisphere), I think the section 4.1 and Fig.3 give a very weak information and could be removed.

- What are the hypotheses to explain the HCN lifetime at 14 km is considerably longer?

-For global maps of Figures 3 to 6 and Figure 8, what is the grid used and how many profiles?

Technical corrections : P 16202 (lines 13 and 14): a priori instead of apriori. P 16206 (line 24) : 2003 and not 20003. P 16207 (lines 4 and 29), p 16211 (line 24), p 16213 (line 18), p16214 (line 16), p16216 (line 7): I think the reference Funke et al. is in 2009 and not 2008. P 16210 (line 7/8): the reference Coheur et al., 2007 is missing in the

reference list. P16216 (line 9): Bangladesh and not Bangla Desh P 16217 (line 1): ground-based and not groundbased. P 16219 (line 24) : 2005 or 2006? P 16220 (line 30) : 1995 and not 1985. It would be nice if the maps 9 and 10 could be enlarged.

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