

## ***Interactive comment on “Highly resolved observations of trace gases in the lowermost stratosphere and upper troposphere from the Spurt project: an overview” by A. Engel et al.***

### **Anonymous Referee #4**

Received and published: 25 August 2005

#### General comments:

This paper is an overview of the SPURT project. Thus it aims to present the entire data set recorded during the 8 aircraft campaigns from November 2001 to July 2003, which covered every season twice. One of the objectives of the project and the interest of such a data set is to provide a seasonal coverage of the UT/LMS up to 13.7 km, higher than most of the aircraft campaigns or programs using commercial aircraft like MOZAIC, CARIBIC or NOXAR. Overall, the paper is good and deserves a publication in ACP. Nevertheless, I have two comments:

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1-) SPURT was designed like an aircraft campaign (regarding the number of measured trace gases, and the number of flights) with the objective of providing a comprehensive data set, leading towards a climatology of the air mass composition in the UT/LMS (page 5086, lines 6-7). The term “climatology” bothers me a little bit. I think it is difficult to give credit to a climatological seasonal composition based on only 2 to 4 days of explorations. I understand the difference between the SPURT objectives and other campaigns dedicated to specific transport processes, but the word climatology should be used more carefully. I would better use the term “exploratory missions” to define the SPURT project. At last, I think it would be interesting to see comparisons with most intensive data sets like MOZAIC, CARIBIC or NOXAR (at least for common altitudes) for example in order to replace the SPURT data in a much longer sampling period of the UT/LMS. Then it may appear that the SPURT data set is (climatologically) representative of the air mass composition in the UT/LMS.

2-) A (brief) overview of the project has been already presented in Hoor et al., 2004 (ACP). Of course this present paper by Engel et al. is more complete and give more recent references but it should be mentioned and the new results or information should appear more clearly. For example, the Hoor et al., reference appears 5 times in the conclusion. This is why I address the following comments: i) As an overview, I think it would be particular valuable to further address the characteristics of each gas in terms of its known background distribution, its lifetime, its major source and sink, its seasonal and vertical variations, and finally why is it so important to measure it in such a project (related to transport and mixing issues). For example it is particularly well written in Hoor et al., 2004 for CO and N<sub>2</sub>O only. I would expect the section 2 to give this kind of information. Some of them are briefly given either in introduction and/or in section 5 (CO for example). ii) Section 5 would then be more focused on presenting the data set (and the associated figure) of every species and on giving the references of specific analyses. Indeed, I do not particular like the equivalent latitude - theta representation for such an overview paper but I agree it is probably the easiest way to show the entire data set. It would be nice to see some characteristic vertical profiles

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(simply in altitude coordinates or referred to the tropopause altitude) and/or some cross correlation between trace gases during specific seasons or regions of interest (colored with altitude or theta for example). iii) Finally, the conclusion should further address the answers to questions like “what have we learned from SPURT?” “Do we still need another campaign like SPURT?” “What recommendations could you give for future campaigns?”.

Specific comments: - p5086, I10 : “to reach a altitudes of up to” must be “to reach altitudes” - p5088, I11 : “horozontal” - p5096, I5: “denortes” - p5098, I5: “The northbound lag” must be “the northbound leg” - Introduction, p5084, I1-4: A recent analysis using the MOZAIC data referred to the tropopause altitude (Thouret et al., ACPD 2005) also illustrates this last statement. However, I do not know whether it can be cited yet. - End of the introduction: Authors may add the reference of the recent analysis by Tarasick et al., JGR 2005 to further illustrate the different behaviors of the ozone trends along with Logan et al., 1999 and WMO, 2003.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 5081, 2005.

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