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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Seasonal cycles and variability of O_3 and H_2O in the UT/LMS during SPURT" *by* M. Krebsbach et al.

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This paper uses several statistical techniques to describe the characteristics of in situ ozone and water vapor in the tropopause region as measured by the SPURT campaign. The statistical analysis of the trace gases is used to infer transport features in the UT/LS for each season. The SPURT data set has been shown to be unique and highly informative by several previous publications and this one adds to that list. The authors have a good knowledge of previous work on the subject and make frequent comparisons to previous findings. The statistical analysis chosen is appropriate for the summation of a large number of measurements while still revealing outliers and minimizing averaging. Overall, the paper is a useful contribution to the knowledge of

trace gas distributions in the UT/LS and the transport in this region so I recommend publication with minor revisions listed below.

Specific comments:

Pg. 7249, line 4: reverse the words “play” and “therefore”

Line 12: “have a strong impact”

Pg. 7250, line 10: reverse the words “measure” and “routinely”

Pg. 7252, lines 8-10: I don’t understand the sentence that starts "Similarly, the JOE instrument..." I think you mean that the JOE instrument only provides qualitative data at low altitudes but you should rewrite this sentence to more clearly state that.

Pg. 7257, lines 13-14: You state that in the LMS a clear seasonal cycle in H2O is present with maximum in summer and minimum in winter. But Figure 3 shows that May has lower H2O compared to April. What’s interesting about this is that O3 is lower in May compared to April as well. So whatever caused the H2O to be lower in May also resulted in lower O3. Do you have any explanation for what might have caused this? Could it just be a sampling issue?

Pg. 7258, line 14: change to "...it is necessary to further investigate..."

Pg. 7258, lines 24-25: I’m not sure why you say that the seasonal cycle in H2O in the UT and LMS are not a priori expected to be in phase. In summer you have increased convection which brings high water vapor into the UT and a more porous tropopause barrier which brings the water into the LMS. In winter you have larger downward transport which brings low water into the LMS and a stronger tropopause barrier so less water enters from the UT. There is also less convection so you would expect lower water vapor in the UT. I’m just pointing out that qualitatively I would expect H2O to have the same phase in the UT and LMS based on what we know from previous work.

Pg. 7262, lines 11-12: I’m not sure what “kink” is referred to here.

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Pg. 7262, lines 13-14: Why do you think the H2O distribution is more compact when related to theta compared to PV in the summer? This seems worth making some comment about.

Pg. 7263, line 4: "intercomparisons provide evidence..."

General comment: Too much use of the word "anyhow" to start a sentence.

Figures 4-6, especially 5, should be enlarged, it is hard to see some of the features described in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 7247, 2005.