

Interactive comment on “On the quality of the Nimbus 7 LIMS Version 6 water vapor profiles and distributions” by E. E. Remsberg et al.

Anonymous Referee #1

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This paper describes the availability of a reprocessed H₂O data set from the NIMBUS7/LIMS instrument. This data is of historical value because it was taken from October 1978 to May 1979 (over 30 years ago). It provided near global coverage with sufficient measurement frequency that daily maps of the H₂O field can be created. These historical data sets are of great value to the scientific community especially when looking for changes in the atmospheric circulations that may be occurring. Comparing these data to Aura MLS does suggest that the stratospheric circulation has changed. This of course has implications for the stratospheric H₂O trend. Reprocessing this data with modern algorithms and making the scientific community aware of this is very valuable and I recommend publication.

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I believe the paper can be strengthened by considering a few issues below.

Is there any particular reason an onion peeling retrieval was used instead of optimal estimation?

The reprocessing used HITRAN 1996 data. These are obsolete now that HITRAN 2004 is available. Are there any differences between these and the 2004 tables?

There is a statement (top of page 9) that says in effect, the lowest useful retrieval pressure for V6 is higher (ie lower in the atmosphere) than it is for V5 because the V6 temperatures are warmer. Why is that?

When comparing the November zonal means between MLS and LIMS, there is a statement saying that the dryer values seen by MLS (~2ppmv drier) are an indication of the expanded area and coldness of the SH winter polar vortex. This seems like a substantial change. Is this supported by analyses such as NCEP or ECMWF?

The comment refers to 7a which shows the tape recorder. I tried as best I could do a comparison to Aura MLS as historical changes in the amplitude will provide clues to possible circulation changes and the potentially the long term trend in stratospheric H₂O. It appears for the pressure levels between 20/22 hPa to 10 hPa, the LIMS tape recorder shows half the amplitude with a temporal maximum or minimum occurring about half a month earlier than MLS. I define amplitude here as the maximum difference between the observed extrema over the 7 month period observed by LIMS. For pressures greater than equal to 30 hPa, I don't think LIMS is properly capturing the taperecorder because the minimum occurs on 1 Feb. which lags MLS by 15 days whereas the lower pressures, LIMS maxima/minima would lead MLS by about 15 days. Also 1 Feb appears to coincide with the temperature minimum (non altitude varying) shown in Figure 7b.

Two questions regarding the taperecorder. How confident are you that the amplitude is accurately measured? Given that LIMS and MLS vertical resolutions are similar is

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it robust to say that the tape recorder amplitude doubled since 1979? The second question are you sure that there is no temperature contamination in the water vapor fields especially for $P \geq 30\text{hPa}$. It actually still might be useful to make the taperecorder plot as an anomaly where you subtract the 7-month mean off for each pressure level.

I hope this is helpful.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 17903, 2009.

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