

## ***Interactive comment on* “Classification of Northern Hemisphere stratospheric ozone and water vapor profiles by meteorological regime” by M. B. Follette et al.**

### **Anonymous Referee #4**

Received and published: 15 August 2008

Review of "Classification of Northern Hemisphere stratospheric ozone and water vapor profiles by meteorological regime" by M. B. Follette et al.

The authors used total ozone gradients from TOMS to locate different meteorological regimes, divided as by synoptic fronts to tropical, midlatitude and polar regimes. They applied this division to ozone and water vapor profiles measured by HALOE and SAGE with the motivation "...to determine how well, and over what altitude ranges and seasons, stratospheric ozone and water vapor profiles can be usefully differentiated by meteorological regimes." The work is very much based on Hudson et al. (2003), here applying the regime concept to satellite data instead of ozonesonde data, and broaden-

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ing the scope to monthly climatologies of the trace gas profiles. The paper emphasizes that vertical mean profiles should be regarded in their synoptic context rather than according to their latitude. This idea is not new to the scientific community and has been approached in various ways, introducing e.g. equivalent latitude, or tropopause based coordinates. Although a difference in tropopause height between the regimes is identified as major contributor to the trace gas variability in the lower stratosphere, the paper is completely lacking any discussion of the related dynamics. In the current version, the aim of the paper remains vague. The text is mostly descriptive and provides few interpretation. To my opinion, some parts can be considerably shortened (see below), while the discussion of the profile climatologies has to be substantiated by discussing dynamical processes in the UTLS (e.g. isentropic transport, TTL).

#### GENERAL COMMENTS

Section 4.1: A step forward from the Hudson et al. (2003) paper can be the focus on the climatological profiles. While Figure 1 demonstrates very well the division of satellite profiles to different total ozone zones / meteorological regimes, the presentation of the single profiles in Figures 2 and 3 is redundant.

Section 4.2: Does the comparison of HALOE and SAGE climatologies (p.13387, line 6 p.13388, line 10; Figure 7) add any scientific value here ? It seems like this section only highlights the difference in the instruments' sampling patterns, which should not be the goal of this paper.

Section 5: Both comments above are also valid for the water vapor section, implying that the presentation of the single profiles in Figures 9 and 10 is redundant, as well as the comparison of HALOE and SAGE (Figure 13). While the whole analysis should consider a profound discussion of involved transport processes, this is even more important for the water vapor section as e.g. H<sub>2</sub>O is subject to dehydration in the TTL.

#### SPECIFIC / TECHNICAL COMMENTS

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Abstract: Lines 10-14 and 15-18 are repetitive.

p. 13383: Several criteria are defined to identify the ozonepause, but can these really be vertically resolved by the satellite data ?

p. 13386, line 22: The instrument description section 2.2 claims that the HALOE altitude range sampled was from 15 to ~60-130 km, so how reliable are the data in the 10-20 km altitude interval (below 15 km) ?

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 13375, 2008.

**ACPD**

8, S6013–S6015, 2008

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