

## ***Interactive comment on “Stability of temperatures from TIMED/SABER v1.07 (2002–2009) and Aura/MLS v2.2 (2004–2009) compared with OH(6-2) temperatures observed at Davis Station, Antarctica” by W. J. R. French and F. J. Mulligan***

**Anonymous Referee #1**

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Review of ACP manuscript entitled

Stability of temperature from TIMED/SABER v1.07 (2002-2009) and Aura/MLS v2.2 (2004-2009) compared with OH(6-2) temperatures observed at Davis Station, Antarctica

By W. J. R. French and F. J. Mulligan

General comments:

This is an interesting and well written study dealing with the comparison of ground-based OH rotational temperatures at Davis station with SABER and MLS satellite observations.  
C9478

The Davis OH temperature data set is one of the best-maintained and characterized data sets of this kind and is well suited for the verification and validation of satellite data. This paper helps in evaluating the quality of satellite data sets, which are also used for studies dealing with long-term trends in mesopause temperatures. Therefore, the paper is an important contribution, and – in my opinion – should be published subject to minor revisions. Apart from the specific points mentioned below I have three general comments/suggestions:

- a) I suggest including the supplement material in the main paper.
- b) It would be good to present and discuss the temperature trends derived from the individual time series, and not only the trends seen in the differences between the satellite data sets and the ground-based measurements at Davis.
- c) The effect of the limited vertical resolution of the MLS temperature profiles on the comparison needs to be addressed.

Specific comments:

Page 1, line 14: I suggest adding 'miss-distance' to read 'The profile selection criteria – miss-distance < 500 km ..'

Page 2, line 11: 'study of (Oberheide et al., 2006)' -> 'study of Oberheide et al. (2006)'

Page 4, line 7: '2km' -> '2 km'

Page 5, line 1: 'with ~13 orbits per day' -> 'with ~14 orbits per day'

Page 5, lines 1-10: It is also important to mention the limited vertical resolution of the MLS temperature profiles of only about 15 km at mesopause altitudes

Page 7, line 28: 'Burns et al. (2003) found good correlation between Davis OH and sodium lidar temperature at Syowa station at a distance of 1500 km.' Can you quantify this 'good correlation'?

Page 8, line 9: This is a really minor point, but I suggest replacing 'warmer' by, e.g., 'larger', because temperatures cannot really be warm of cold, but only high or low.

Sections 4.2 and 4.3: The trend of the differences between DAVIS OH and SABER / MLS is of course highly relevant, but it would also be interesting for the reader to know what the temperature trends in the individual time series are.

Section 4.3: The vertical resolution of the SABER temperature profiles is with about 2 km quite good. However, this is not the case for the MLS temperature profiles. According to the MLS temperature profile validation paper by Schwartz et al. (2007) (their Fig. 6) the full width at half maximum of the averaging kernels is about 15 km between 0.01 and 0.001 hPa. This means, that the MLS temperature profiles correspond to the actual temperature profiles convolved with a function with about 15 km FWHM. Weighting the temperature profiles with a typical OH VER profile will smooth the profile even more. I'm not sure how to treat the limited vertical resolution of the MLS profiles for this comparison correctly, but this issue needs to be addressed in some way in the paper. The effect of the smoothing can be tested by convolving a sample SABER temperature profile (with high vertical resolution) with the MLS averaging kernels, followed by the weighting with the VER profile. The resulting OH-equivalent temperature should be compared to the temperature obtained from the same SABER profile weighted by the VER profile. Perhaps the difference between these two OH-equivalent temperatures is not that large.

Page 11, line 16: '..' -> ''

Page 12, line 1: There are no spaces between the initials for this reference.

Page 14, table 1, row 'standard error' of the lower table: the standard errors given are '0.3', '0.4' suggesting only one significant digit (to the right of the decimal place). The weighted temperatures and standard deviations, however, have 2 significant digits. If the standard errors have 2 significant digits they should be presented as '0.30' etc.

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Page 16, line 4: 'standard error-in-the-mean'. Do you mean 'error-of-the-mean'?

Supplement material: I suggest including the supplement material in the paper. The manuscript only has fairly small number of Figures and tables, and there should be enough space for the supplement material comprising 3 tables.

Supplement Material, page 1, column 4, row 'MTM Hawaii': 'Gold man' -> 'Goldman'

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