

Interactive comment on “

Retrieval of temperature and pressure using broadband solar occultation: SOFIE approach and results” by B. T. Marshall et al.

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We thank referee #1 for the helpful comments. First, we address the 4 general comments made by this reviewer.

1) SOFIE instrument: An overview of the SOFIE instrument is given in the Gordley et al 2009b reference but for the final version of this paper we will include details for the

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two bands used in this study. Specifically, HgCdTe detectors are used for these bands. The 4.3 μm bandpass is 2259 – 2370 cm^{-1} (50% maximum transmission points) and the 2.7 μm bandpass is 3555 – 3626 cm^{-1} . FOV at a 50 km tangent point is about 1.2 km vertical by 4.1 km horizontal with oversampling to about 0.2 km in the vertical. The retrievals operate on a 2 km vertical grid with multiple interleaves of the data combined to achieve final results. SNR varies with time, location, and altitude. It is nearly 100000 for these bands in the lower stratosphere and about 100 for the 2.7 μm band and 500 for the 4.3 μm band at 100km.

2) Bandpass used in the simulations: The O₂ A band simulations use a bandpass that covers both the P and R branches, 12970 - 13170 cm^{-1} . However, as noted in section 3, using a bandpass that covers only a portion of the P branch (12985 - 13065 cm^{-1} for the simulations shown in figure 3d) results in sensitivities that should allow retrieval of temperatures over a much broader altitude range. The 4.3 μm and 2.7 μm bands are from SOFIE and are described in the previous paragraph. Of these, HALOE measured only the 2.7 μm band and that was similar to the one used by SOFIE. We will add these details to the final version of the paper.

3) Use of the described algorithm: The algorithm, designated F in the various sensitivity plots, is the basic algorithm used for both SOFIE and HALOE for retrieving T(P) from broadband transmission measurements. The various versions of SOFIE differ in details of the radiative transfer model (e.g. accounting for non-LTE, line mixing, FOV effects, etc.) and, for v1.03, the refraction measurements are also used to determine the final T(P) profile. The results shown in section 7 are for a pre-production version of v1.03. We will update figures 29 and 30 to use the production version of the data. We may also add figures that show preliminary results from testing of the next data version, the revisions made to this version are especially significant for the Polar summer comparisons.

4) Relevance to HALOE: As discussed in the previous paragraph, the basic algorithm is the same for HALOE but the application details are different (primarily in use of the

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oversampled data). We will add a statement to clarify.

Next we address the technical corrections discovered by this referee.

P.5747, l.18: will correct as noted.

P.5755, l.29 ff: yes, we will correct this as noted.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 5743, 2010.

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