**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "TES ammonia retrieval strategy and global observations of the spatial and seasonal variability of ammonia" *by* M. W. Shephard et al.

Anonymous Referee #1

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Shephard et al. presented a detailed analysis of ammonia retrieval strategy from the Tropospheric Emissions Spectrometer (TES) satellite instrument. The authors discussed the TES ammonia retrieval methodology, retrieval error analysis, spectral microwindow selection, and sensitivity studies for assessing the TES ammonia signals and cloud influences. A multiple-year global data set of NH3 measurements retrieved from TES was presented and initial comparisons with the GEOS-Chem chemical transport model were conducted. The paper is very comprehensive and well written. The paper is important as it provides a baseline for future applications of TES ammonia measurements to better understand the sources and fate of ammonia in the atmosphere. I recommend publish on the ACP and I only have a few specific comments for

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Interactive Discussion

Discussion Paper

improving the manuscript.

Specific comments:

1. Page 16030, Line 28-29:

It is not clear to me how the constraints were modified to reflect the sensitivity of TES. Please clarify.

2. Page 16031, Line 16:

What are the three different simulated NH3 profiles? Are they for the polluted, moderate polluted, and unpolluted cases? Please clarify.

3. Page 16032, Line 24:

It is not clear from Fig 6 that thermal contrast increases detectability. Is that because for the polluted and moderate polluted cases, nearly all the SNR<1 ones are within 5 K thermal contrast?

4. Page 16036, Line 5-7:

Please also describe the right panels of Fig 8.

5. Page 16058, Fig 6:

Please describe in the caption what the percentage numbers represent.

6. Page 16069, Fig 17:

Is it possible to convert the unit from ug/m3 to ppbv, as for a direct comparison with Fig 15 and 16? Are the TES RVMR values about 30

7. Page 16074, Fig 22:

Please describe in the caption what the bin size is for the probability distribution plots.

Technical corrections:

1. Page 16026, Line 25: "initial comparisons results" should be "initial comparison results"

2. Page 16035, Line 10: "Sect. 3.3.1" should be "Sect. 3.1.1"

3. Page 16043, Equ. (A4): Missing the minus sign in the equation.

4. Page 16043, Line 17: "Eq. (10)" should be "Eq. (A7)"

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 16023, 2011.