**Atmospheric
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Interactive comment on "Methanol from TES global observations: retrieval algorithm and seasonal and spatial variability" *by* K. E. Cady-Pereira et al.

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Received and published: 13 August 2012

The authors with to thank Dr. Stavrakou for her insightful and helpful comments and suggestions. The authors fully agree that more and better data are needed for validating satellite retrievals of methanol and other trace species.

p. 11824 l. 8: The abstract states that TES provides "generally between 0.5 and 1.0 pieces of information". But in section 3.1 (p. 11831) we learn that about half the retrievals have DOFS < 0.5. Please clarify.

The original text was incorrect. Rewritten to state that TES generally provides less than 1.0 pieces of information.

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p. 11829 l. 14-15: please describe brieïňĆy the procedure used for the evaluation. Also describe shortly the aircraft measurements used here.

We have provided more information as requested. Further details can be found in Wells et al., 2012

p. 11830 l. 14: "the a priori proïňĄles are chosen based on location and month" : unclear, please explain more explicitly.

A priori choice is explained in more detail.

p. 11830 l. 22: "the variability is reduced in order to obtain tighter constraints...": please be more explicit. Explain the nature of this reduction. Also, why is the covariance matrix calculated in log space?

More details and an explanation of the use of log space in the retrieval have been added.

p. 11831 l. 18: it might be useful to provide separate ïňĄgures for the DOFS over land and over ocean.

In order to maximize the number of retrievals finding detectable CH3OH, very few retrievals over ocean were performed from the TES Global Surveys or Special Observations. We included some more DOFS statistics from the TES observations coincident with the ARCTAS campaign.

p. 11832 l. 6: as the other referee, I think the RVMR should be more precisely and explicitly deïňĄned. Also I'm not completely convinced that using the RVMR improves comparison with independent data or models, as discussed by the other referee.

The authors agree that the RVMR concept was not fully detailed in this paper. However, extensive details can be found in Shephard et al., 2011. Rather than repeating that text, we found it more useful to add an equation and some text in section 3.2, and a supplemental section with some examples and discussion on the appropriateness

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of using the RVMR for measurement/model comparisons. Please see response to reviewer 1.

p. 11837 l. 10-15: GFED2 is unavailable for year 2009, but other biomass burning inventories (e.g. GFED3) are available, which could be used to assess the representativity of the GFED2 data used in GEOS-Chem for 2009. This is of some impor tance given the strong interannual variability of those emissions in e.g. South America.

The emissions from GFED3 for 2009 are actually lower than those from GFED2 for 2008.

p. 11837 l. 17-18: "Figure 11 shows that TES often reports higher CH_3OH concentrations than predicted by GEOS-Chem...": That statement is a bit simplistic. It is true that TES methanol is often higher than in GEOS-Chem in the Northern Hemisphere. But the opposite is also true over many areas, in particular over forests (over Canada, the S-E US, the Siberian taiga, etc.). It is quite striking that, similar to IASI vs. IMAGES in Stavrakou et al. (2011), the strongest model underestimation occur over dry/arid places such as Central Asia and the Western US. This should be mentioned.

We agree that the discussion here needed to be amplified. We have taken the reviewers suggestions and added text that reflects the reviewer's comments.

p. 11838 l. 2-6: Comparison with the results of Stavrakou et al. (2011) are difﬁcult due to the possibly different a priori emissions (Millet et al. vs. MEGANv2). Moreover, note that the IMAGES optimization in Stavrakou et al. was also evaluated against aircraft measurements from several campaigns.

We have rewritten this section to state: "These differing results could either reflect the greater sensitivity of TES to methanol concentrations close to the surface, or differences between the canopy models and meteorological fields used in GEOS-Chem and IMAGESv2."

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 11823, 2012.

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