

## ***Interactive comment on “Characterizing mega-city pollution with TES O<sub>3</sub> and CO measurements” by C. Shim et al.***

### **Anonymous Referee #1**

Received and published: 6 November 2007

The authors purpose is to use TES CO and ozone observations with in situ observation taken during the MILAGRO/INTEX-B campaigns over Mexico City to show that TES data can be used to characterize mega-city pollution outflow. As I discuss below, they do not provide a convincing argument that it can. Therefore, I do not recommend publication of this manuscript unless the serious deficiencies that I list below are addressed.

The topic of the manuscript is appropriate for ACP.

Here are my comments in no particular order:

Your title implies that TES ozone and CO measurements can be used to characterize mega-city pollution, but you say it can be used for only high-altitude cities. Besides

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the MCMA, for what other mega-cities might your satellite data be used? Of course, there are high-altitude cities, such as La Paz and Quito, but are there high-altitude mega-cities elsewhere. I would suggest that you change your title to be specific to the MCMA, since the vast majority of mega-cities are actually at low altitudes and on coasts.

The TES coverage is sparse during the field campaign. Is this a serious limitation of the TES data for characterizing the outflow of pollution?

I disagree with the last sentence of your conclusions: The results presented here suggest that TES tropospheric ozone and CO profile retrievals can be used to characterize mega-city pollution outflow on a regional to global scale. As you show in Figure 3, the TES averaging kernels are low or near zero in the boundary layer over most of the globe.

Figures 5 & 6 indicate that neither TES nor GEOS-Chem (with TES averaging kernels) actually show an enhancement in CO or ozone over the MCMA from 600-800 hPa, especially in relation to high TES values seen over the Gulf of Mexico and the Pacific. It makes me wonder just how noisy the TES data are. Does GEOS-Chem show an enhancement when the averaging kernels are not applied, or is this a CTM deficiency?

Figures 5 & 6: How can you say that TES can be used for pollution outflow when it does not even detect the pollution outflow that is clearly seen in the aircraft data?

In the same vein, you say on p. 15196 lines 2-5: As explained in Section 2.3, TES averaging kernels were not applied to aircraft measurements for the comparison; that sharp enhancement of aircraft ozone could be smeared or reduced if the TES averaging kernel were applied to aircraft measurements. So, does this mean that TES does not effectively see 600-800 hPa over the MCMA, even though the averaging kernel indicates that it should be sensitive?

Sections 3 and 4 are obviously misnumbered. And there is no Section 3.3 as cited on

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line 12 on p. 15196.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15189, 2007.

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