

## ***Interactive comment on “Trans-Pacific transport of Asian dust and CO: accumulation of biomass burning CO in the subtropics and dipole structure of transport” by J. Nam et al.***

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We appreciate the comments and suggestions by C. McNaughton. Figures on model assessment have been added to the supplemental material. Text and references have been revised when appropriate.

### 1. CO and Aerosol Extinction at ESRL:

CO

Trinidad Head does not have CO data for May 2003. CO at Mauna Loa has a good agreement with GEOS-Chem CO in May 2003 in general, although we do not find clear

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evidence of fire CO impact at this site.

Aerosol Extinction (converted to AOD to compare with GEOS-Chem AOD)

The Mauna Loa site has lower AOD than model and Trinidad Head has higher AOD than model in May 2003. For both monitoring sites, the model has a good agreement with MODIS. This is partly because GEOS-Chem calculates AOD using an AOD algorithm similar to MODIS AOD retrieval. Previous studies have found a strong spatial variations of the difference between MODIS AOD retrievals and in-situ measurements (Chu et al., 2005; Levy et al., 2003; Heald et al., 2006; Chin et al., 2002).

2. AERONET AOD data:

AERONET AOD measurements from all the suggested sites (Fresno, Rogers Dry Lake, Mauna Loa, and San Nicolas) are lower than MODIS and GEOS-Chem AOD, which is consistent with the aerosol extinction ( $m^{-1}$ ) comparison from the two ESRL monitoring sites and might be attributed to the same reason discussed above. For this paper, our main interest is to understand if the model can capture the transport pathways evident in the MODIS AOD measurements. Therefore, we did not explore in detail the potential reasons for the absolute difference of simulated and MODIS AOD or the difference between MODIS and AERONET AOD. We stated in the introduction “We attempt to minimize the uncertainty of the measurements by finding the strongest trans-Pacific transport events in the satellite observations and apply a global chemical transport model (CTM), GEOS-Chem, to analyze these events. In the analysis, we take into consideration the measurement uncertainties and focus the modeling analysis on the characteristics well defined by the satellite measurements.”

3. MPLNET (Monterrey)

The AOD vertical distribution from MPLNET in Monterey shows high AOD up to 8 km, which is consistent with GEOS-Chem simulation shown in Figure 5 in the ACPD paper. However, the agreement does not necessarily indicate that the high AOD observed at

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the site is due to dust transport from Asia since the site is located near anthropogenic sources. The focus of the paper is on the trans-Pacific transport pathways, not on the effects over the western coast of North America. To assess the latter impact, more detailed analysis on in situ observations from multiple sites along the coast must be conducted. The attributions from different sources to the observed AOD need to be analyzed in the model simulations. Your comments brought up a very interesting question, which requires a follow-up study.

4. Suggested articles have been reviewed and the paper has been revised to reference them.

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