

<b>Reviewer 1</b>	
<b>Comments</b>	<b>Response</b>
<p>trying to correlate MODIS AODs at 447 nm and 550 nm (table 2 and text on page 10), which does not show any new thing or make any sense due to the fact that MODIS dark target algorithm reports AOD at 550 nm by interpolating AODs at 447 nm and which does not show any new thing or make any sense due to the fact that MODIS 667 nm. In other words AOD at 550 nm is calculated using AOD at 447nm; therefore they must show high degree of correlation.</p>	<p>The AOD at 550 nm was calculated using the AOD at 447 and 667 nm and assuming one of 9 aerosol models used in the MODIS retrieval algorithm. The point of this exercise was to demonstrate that none of the AODs at different wavelengths will add any significantly new information to the analysis.</p>
<p>The poor correlation in AODs may also arise due to the fact that only on rare occasion both deep blue and dark target algorithms retrieve AOD values for the same pixel due to limitation by surface on each algorithm. Therefore, it is possible that two AODs represent two different geographical areas, which is not visible as data is averaged over 5x5 pixels in this study.</p>	<p>This comment is added in Sec 3.2.</p>
<p>In order to see the impact of adding a specific parameter to GAM, it is important to keep the number of observation same (keep the sample same).</p>	<p>See Table 6 and discussion.</p>
<p>To improve the number of data points, quality flags associated with satellite data are ignored (page 8) – this condition force study to use poor (or unknown) quality of the data.</p>	<p>The decision to ignore the quality flags was based on the practise of other researchers and a study that showed little effect of quality flags on correlations for the case of a linear regression. To satisfy the reviewer we undertook to explore the effect of using all data and only Good and Very Good data points on one of our GAM retrievals. The results are shown in Table 4 and demonstrate that there is little effect.</p>
<p>OMI pixel is large enough therefore single pixel is selected (page 8) –OMI pixel size is 13x24 km whereas MODIS is 10x10 km. So if you are averaging 5x5 MODIS pixels, which covers approximately 50x50 km area then the use of single OMI pixel cannot be justified.</p>	<p>See table 3 and discussion for the effect of grid size on the GAM results.</p>

<p>Meteorological effects are represented with a seasonality parameter – local meteorological is one of the most important (after emission), which controls the PM<sub>2.5</sub> at surface and which cannot be captured just by seasons. Several studies in past have shown this [Tai et al., 2011, Atmos. Chem. Phys. Discuss., 11, 31031-31066, 2011, Liu et al., 2004, 2005, 2006].</p>	<p>Meteorology varies greatly between different locations. In the San Joaquin Valley we are fortunate that it is not only an important driver for PM concentrations but also very seasonal. Watson, et al., 2000, provide a detailed discussion of the relationship between the seasonal meteorology and PM concentrations in the San Joaquin Valley. Since there are not any reliable PBL height measurements that we could use in our retrieval we were luck to be able to use the seasonal parameter as a proxy for this case. We attempted to de a better job of explaining this in Sec. on Parameter Sensitivities.</p>
<p>OMI NO<sub>2</sub> does not typically correlate well with surface measurements because surface measurement is a point measurement while satellite data represents a more distributed value (page 14). If this is the case then why AOD from satellite should match with surface point measurement? Is it possible that OMI derived NO<sub>2</sub> is not sensitive enough to boundary layer NO<sub>2</sub> concentration due to its use of UV channel and low signal to noise ratio.</p>	<p>There may be other reasons besides a spatial mismatch for the discrepancy between NO<sub>2</sub> and NO<sub>x</sub> measurements. We noted early in our investigation that PM correlated well with surface NO<sub>x</sub> measruements, which was no surprise in thsi area. It was a bit surprising that satellite NO<sub>2</sub> measuremetns correlated so well with PM. The relationship between NO<sub>2</sub>, NO<sub>x</sub>, and PM is and interesting and complex issue that demands futher study. We are in the process of working on this issue right now. See discussion in sec on Parameter Sensitivities.</p>
<p>Figure 4 – not clear what is sensitivity means?</p>	<p>We have defined sensitivity more clearly in Figure 4 and its discussion.</p>