RESPONSE TO REVIEWERS

We would like to thank Dr. Sayer and Dr. Smirnov for their comments. We have done our best to address each of the points as detailed below.

Note: All reviewer comments in *italics*; all responses by the authors in normal font.

#1. We believe that the lidar ratio used in the study for the aerosol (20 at 532 nm) is too low, resulting in an underestimate of the AOD retrieved by CALIPSO. We believe a more appropriate value is of order 34, increasing the reported AOD (at 532 nm) by a factor of approximately 1.6.

The lidar ratio used for CALIPSO for clean marine aerosols are 20 at 532 nm and 45 at 1064 nm (Omar et al., 2009). This study notes that other estimates of the marine lidar ratio are slightly high than this at 532 nm (giving as examples 23.5, 28, 25.4, and 20.3). Smirnov et al. (2003a,b) present average aerosol size distributions from AERONET inversions corresponding to unpolluted maritime conditions at Lanai and Midway Island. Although these are island sites, they are remote, and the analysis in these two papers aimed to remove those observations with significant non-maritime component to the aerosol. We have calculated lidar ratios based on these average size distributions, and obtain lidar ratios in the range 30-34 (dependent on whether the results at Midway or Lanai are used, and examining also the size distributions binned by wind speeds from Smirnov et al (2003b)). From this analysis we also found that the change in lidar ratio for different wind speeds was of order 10%, so the use of a constant lidar ratio is probably a second-order error only when performing your analysis.

Recently we have been performing a similar analysis (unpublished) with the Version 2.0 AERONET database (released 2006), and obtain very similar results (34.6 for Lanai, 33.1 for Midway Island at 532 nm).

If the AODs presented in this work are recalculated using these lidar ratios from AERONET data, as we believe is appropriate, the results would be much more similar to the other relationships shown in your Figure 6. We suggest the authors add a regression fit using this alternative lidar ratio, to show the effect of this on their results, since the assumed lidar ratio has a very strong influence on the work they are presenting.

We agree with the reviewers that assumed lidar ratio has a strong influence on the results. The following text was added to the manuscript: "Analysis AERONET database (Smirnov et al., 2003a) also shows 532 nm lidar ratios of 34.6 (for Lanai) and 33.1 (for Midway Island). When lidar ratio of 34 is considered, the CALIPSO-derived AOD (at 532 nm) increases by a factor of approximately 1.6 (Sayer and Smirnov, personal communications), yielding maritime aerosol optical depth values closer to ones suggested by Smirnov et al. (2003a) (see supplementary Fig. S2)."

#2. *We also calculated lidar ratios at 1064 nm for the same cases (although CALIPSO AOD at 1064 nm is not presented in the current paper). We find lower values than those from Omar et al,*

2009: from the version 1 AERONET results (as in Smirnov et al, 2003a) we obtain 34.0, and from the version 2 AERONET data 36.8 for Lanai and 36.0 for Midway.

Comparison of CALIPSO-derived AOD at 1064 nm and one calculated using the regression equation of Smirnov et al. (2003a) has been added to the manuscript as supplementary Fig. S3.

References

Smirnov, A., B. N. Holben, T. F. Eck, O. Dubovik, and I. Slutsker, Effect of wind speed on columnar aerosol optical properties at Midway Island, *J. Geophys. Res.*, 108(D24), 4802, doi:10.1029/2003JD003879, 2003a.