

Interactive comment on “Dust altitude and infrared optical depth from AIRS” by C. Pierangelo et al.

C. Pierangelo et al.

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All Referee Comments have been answered in our previous author comment published during the interactive discussion process on the ACP-Discussion website. Changes relative to the manuscript published in ACPD were given in this previous comment too.

Besides, during the review process, we realized our misunderstanding of results from Highwood et al., 2003: they did not report the ratios of the infrared to visible optical depth but the 10 microns optical depth. So, as they give the visible optical depth (0.67), we can deduce the infrared to visible ratios they used : 0.34 for WMO model, 0.37 for Fouquart model, and 0.59 for Volz model (and not 0.23, 0.25 and 0.40 as it was written in our manuscript). These values still compare quite well with our result (0.31), even if the AIRS AOD/MODIS AOD is in the lower estimates. It is worth pointing out that 0.31 is an average of the Infrared to Visible optical depth over all the Atlantic 0-30 degree band, for one month (July 2003), whereas the values given in Highwood et al. are obtained with a size distribution observed during one flight the 25th of September,

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2000, from Dakar to Capo Verde Islands.

As a consequence, we decided to study the effect of size distribution on the infrared to visible optical depth ratio. Using the aeronet retrievals over Capo Verde (effective radius and width of coarse and accumulation mode), the refractive indices at 0.55 microns used by MODIS retrieval, and the refractive indices at 10 microns from the MITR model, we computed with a Mie radiative transfer code the infrared to visible extinction ratio. The calculated ratio varies from 0.4 to 0.55 depending on the month considered, and the AIRS to MODIS ratio varies from 0.3 to 0.5 for a small area over Capo-Verde. We can thus check that the order of magnitude of our product is reasonable. However, we must underline that AERONET size distribution retrievals are available only 2 to 5 days each month, whereas the AIRS to MODIS ratio is a monthly average.

Consequently, we modify the following sentence (p3344, line 6): "This value compares well with ratios reported by Highwood et al.(2003) for 3 dust models: 0.23, 0.25, and 0.40. For the 5 other months, the ratio..." by "This value compares well with ratios reported by Highwood et al.(2003) for 3 dust models: 0.34, 0.37, and 0.59. Our value, slightly smaller, is an average of the Infrared to Visible optical depth over all the Atlantic 0-30 degree band, for one month (July 2003), whereas the values given in Highwood et al. are obtained with a size distribution observed during one flight, on the 25th of September, 2000, from Dakar to Capo Verde Islands. Using the AERONET retrievals over Capo Verde (effective radius and width of coarse and accumulation mode, Dubovik and King (2000)), the refractive indices at 0.55 microns used by MODIS retrieval, and the refractive indices at 10 microns from the MITR model, we computed with a Mie radiative transfer code the infrared to visible extinction ratio. The calculated ratio varies from 0.4 to 0.55 depending on the month considered, and the AIRS to MODIS ratio is of the same order of magnitude, from 0.3 to 0.5 for a small area over Capo-Verde. However, we must underline that AERONET size distribution retrievals are available only 2 to 5 days each month, whereas the AIRS to MODIS ratio is a monthly average. For the 5 other months, the AIRS to MODIS AOD ratio..."

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