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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Urban Visible/SWIR surface reflectance ratios from satellite and sun photometer measurements in Mexico City" *by* A. D. de Almeida Castanho et al.

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We sincerely thank the referee for the recommendations and comments that were very useful to clarify and improve the original manuscript. All the referee comments have been carefully addressed. In the report bellow we describe the specific action we took in respond to each of the comments.

Referee Comments: 1) How does the retrieved albedo compare to the MODIS BRDF product as well as the surface albedo derived in collect 5 ?

Authors Response: The comparison with MODIS operational surfaces reflectance product has been included in the manuscript following the suggestion of both referees (# 1 and 2) (Page 13, line 5). The MODIS collection 5 now in operation uses a new

parameterization to estimate the surface reflectance in the visible wavelength based on the scattering angle and Normalized Difference Vegetation Index at the shortwave infrared (NDVIswir), Levy et al., 2007. Based on the parameterization presented for any NDVI swir the maximum value that the ratio between Red and SWIR can assume in Collection 5 is 0.6 for maximum scattering angles of 140ž. Based on the L2 product of surface reflectance in collection 5 in Mexico City urban region the RED to SWIR ratios ranged from 0.49 up to 0.52. These values are lower compared to our results in this work 0.73 for maximum scattering angles of 140ž. For higher scattering angles this ratio increases to around 0.77, while for the MODIS operational products in Collection 5 it goes up to 0.6. The MODIS products still underestimates the ratios specifically for urban areas. The MODIS operational algorithm was not designed for highly urbanized areas without vegetation. This is an important issue that has to be taken into account when detailed studies over urban areas are addressed.

Referee Comments: 2) As quoted in the conclusions to the paper, "This variability of the ratio at 1.5 km resolution is significant enough to increase the uncertainties in the tau_a values retrieved from satellite at the higher spatial resolution. Therefore, a surface ratio function would need to be defined to represent the large heterogeneity of an urban area if tau_a is to be derived from MODIS at 1.5 km resolution" However, their figure 4 seems to indicate a fairly stable correlation coefficient in 4 of the 5 areas while the 5th area is quite different so it would seem possible to at least carry out the optical depth measurements at 1.5km using these different reflection models and observe any improvements.

Authors Response: The referee is right that, if we could apply a mask with the different 'models' to different types of surfaces, this would help to improve the aerosol optical depth products. However, further analyses are necessary to statistically define a parameterization of the ratio that takes into account the different types of surfaces.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 8113, 2007.

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