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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric effects of volcanic eruptions as seen by famous artists and depicted in their paintings" *by* C. S. Zerefos et al.

C. S. Zerefos et al.

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Response to referee D. Stevenson

We would like to thank the reviewer for his valuable comments.

All three comments of the reviewer are discussed now in more detail in a new section 3.4 called "Error sources and uncertainties of the AOD estimates". In that section we also consider the suggestions from B. Mayer. Here we present briefly the main issues related with errors and uncertainties.

Concerning the errors introduced due to the variability of R/G within a painting and our ability to estimate the SZA from a painting the following table has been included in this section, which gives some lower and upper estimates of the finally induced error in our AOD estimates:

Error in AOD derived from the average R/G error (+/- 0.014 according to table A1)

For SZA=75 and AOD=0.1 the error is <0.05

For SZA=75 and AOD=0.5 the ranges between 0.06 and 0.12

For SZA=85 and AOD=0.1 the error is <0.05

For SZA=85 and AOD=0.5 the ranges between 0.1 and 0.18

Concerning the error of AOD derived from a typical error in estimating the SZA (ś2o)

For SZA=75 and AOD=0.1 the error is <0.05

For SZA=75 and AOD=0.5 the error is 0.07

For SZA=85 and AOD=0.1 the error is <0.05

For SZA=85 and AOD=0.5 the error is <0.05

We did not put error bars in Figure 6 but we added in the caption of Figure 6 a comment on the uncertainty of the AOD estimates.

Concerning the errors induced from the use of different photographic techniques the following simple experiment has been conducted. The same sunset image has been photographed with two different cameras and three different exposure times. These have been analysed with a similar manner as the paintings. The differences of the estimated values R/G between the different images were less than 0.01 and are smaller than the variability of the R/G ratio within the image.

Concerning the bias between the model R/G ratios and the ones extracted from the paintings, these are discussed in detail to our answer to B. Mayer. Most of the bias found between measured and modeled R/G ratios can indeed be explained by the fact that our model calculations are based on the hemispheric diffuse irradiance, while the measurements on the paintings are based only on the part of the sky above the horizon and they correspond to a field of view much less than 180o. However, as mentioned in

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the revised paper, radiance estimates from the model at high SZA are not very accurate and therefore we have not used them for the retrieval of the AOD. A small part of the bias can also be explained when using RGB values directly calculated from the model and not from certain wavelengths.

The technical corrections proposed by the reviewer have all been considered in the revised manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5145, 2007.