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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.

Anonymous Referee #4

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General comments

This paper is a highly innovative attempt to combine digital color information from paintings with radiative transfer calculations in order to derive changes in Aerosol Optical Depth (AOD) following major volcanic eruptions. The authors analyzed a very large number of paintings, examined the implications of changes in solar zenith angle, and provided comparisons of their results to those of previous works. The paper is well organized and clearly written, and it's publication will provide a valuable new resource in the attempts to reconstruct past atmospheric conditions and their climate implications. The paper could well be published in it's current form. A few issues that may lead to potential improvements are detailed below.

Specific comments

The authors do a very good job of comparing their results to DVI values and to results of relevant previous works but do not discuss at all how those other estimates were derived and what the potential sources of the differences between this and previous works are. Table 1, for example, shows that the AOD values derived in this work are for the most part higher than those derived in other studies. The authors should briefly discuss the methods of the AOD reconstructions of those other studies and the expected differences in the values depending on the reconstruction method.

The authors do not discuss in the paper potential future applications of their results. How can, for example, their AOD time series be used in simulations of past climate conditions? What advantages would it provide compared to studies using DVI or other indices? What is the value of having reconstructions of both the background and the volcanic AODs? The authors have created an exciting new tool and it would be useful if they provided some suggestions for it's potential future use.

Finally, the potential sources of the bias of the R/G ratios of the paintings compared to the model are not clearly discussed in the paper. A contributed review suggests that this may be due to the use of irradiance rather than radiance values and to the large angular range used in the model calculation. The suggestion appears plausible and the authors should comment on it and explore it further if they believe that it is a valid one.

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

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