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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Further evidence of important environmental information content in red-to-green ratios as depicted in paintings by great masters" *by* C. S. Zerefos et al.

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Reply to Prof. Alan Robock's comments

We would like to thank Prof. Alan Robock for his valuable comments.

Comment 1: The abstract needs correction. The first sentence should not talk about the process. Rather the abstract needs to be about the new science. And abstracts should not have references. The rest needs some improvement in the language.

Reply to comment 1: The abstract has been revised according to the recommendation by Alan Robock as follows: "We examine sunsets painted by famous artists as

proxy information for the aerosol optical depth after major volcanic eruptions. Images derived from precision colour protocols applied to the paintings were compared to online images, and found that the online ones, previously analyzed, provide accurate information. Aerosol optical depths (AODs) at 550 nm, calculated by feeding red-to-green (R/G) ratios from a large number of paintings to a radiative transfer model, were well correlated with independent proxies from stratospheric AOD and optical extinction data, the dust veil index, and ice core volcanic indices. AODs calculated from paintings were grouped into 50-year intervals from 1500 to 2000. From each 50-year time period the year of the eruption and the 3 following years were excluded. The remaining "non-volcanic" years provide additional evidence of a multidecadal increase in the atmospheric optical depths during the industrial "revolution." The increase of AOD at 550 nm calculated from the paintings grows from 0.15 in the middle 19th century to about 0.20 by the end of the 20th century. To corroborate our findings, an experiment was designed in which a master painter/colourist painted successive sunsets during and after the passage of Saharan aerosols over the island of Hydra in Greece. Independent solar radiometric measurements confirmed that the master colourist's R/G ratios which were used to model his AODs, matched the AOD values measured in situ by co-located sunphotometers during the declining phase of the Sahara aerosol. Regardless of the school, red-to-green ratios from great masters can provide independent proxy AODs that correlate with widely accepted proxies and with independent measurements."

Comment 2: I recommend that the authors use more recent volcanic ice core-based indices in Fig. 4, in particular Gao et al. (2008) and Crowley and Unterman (2013).

Reply to comment 2: The proposed indices have been added on Figure 4, Table 1 and references. The revised figure 4 is attached below.

Comment 3: Fig. 6: Caption is wrong on panel. It should be g/m2 or g m-2, but not g/m-2. To write this correctly using GrADS, use: g m'a-2'n

Reply to comment 3: The caption on panel has been revised to g/m2

Comment 4: p 33149, lines 24-25: delete “was used”

Reply to comment 4: Done

Comment 5: Use a comma after every “e.g.” and “i.e.”

Reply to comment 5: Done

Comment 6: The authors should acknowledge that the VEI is not a good index of stratospheric sulfate loading, since it measures the explosivity of a volcano and not its stratospheric injection. A good example of this is the 1980 Mt. St. Helens eruption, with a VEI of 5, but no stratospheric or climatic impact.

Reply to comment 6: The following statement has been added in Table A2, in response to Alan Robock’s comment: “It should be mentioned that VEI is not a good index of stratospheric sulfate loading, since it measures the explosivity of a volcano and not its stratospheric injection.”

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 33145, 2013.

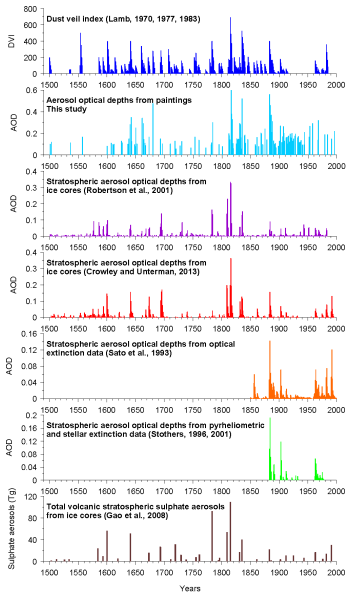

Figure 4. Aerosol optical depth and other proxy indices during the past 500 years from different proxies (see text).

Fig. 1.