

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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Received and published: 28 December 2013

Review of Zerefos et al.

This is an excellent paper and should be published. But I recommend the following revisions.

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. I recommend the following revision:

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We examine sunsets painted by famous artists as proxy information for the aerosol optical depth after major volcanic eruptions. We compared images derived from precision colour protocols 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.

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).

Gao, Chaochao, Alan Robock, and Caspar Ammann, 2008: Volcanic forcing of climate over the past 1500 years: An improved ice-core-based index for climate models. *J. Geophys. Res.*, 113, D23111, doi:10.1029/2008JD010239. <http://climate.envsci.rutgers.edu/pdf/Gao2008JD010239.pdf> You can obtain the data at <http://climate.envsci.rutgers.edu/IVI2>

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Crowley, T. J., and M. B. Unterman, 2013: Technical details concerning development of a 1200 yr proxy index for global volcanism, *Earth Syst. Sci. Data*, 5, 187-197, doi:10.5194/essd-5-187-2013

3. Fig. 6: Caption is wrong on panel. It should be g/m^2 or g m^{-2} , but not g/m^{-2} . To write this correctly using GrADS, use: g m^{-2}

4. p 33149, lines 24-25: delete "was used"

5. Use a comma after every "e.g." and "i.e."

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.

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