

Interactive comment on “Effects of the physical state of tropospheric ammonium-sulfate-nitrate particles on global aerosol direct radiative forcing” by S. T. Martin et al.

D. Cziczo

djciczco@al.noaa.gov

Received and published: 18 November 2003

It is clear that the authors misunderstood the first 'comment' so I clarify it here:

During the last ten years single particle instruments and the Aerodyne Aerosol Mass Spectrometer (AMS) have shown that organics compose a significant amount of the aerosol mass in the free troposphere, in some cases the majority (please see: <http://cires.colorado.edu/jimenez/ams.html#Papers-AMS>). Single particle instruments have shown that insoluble components are found in many, in some regions the majority, of particles. Bates et al., in the '2002 NEAQS' session of the Fall 2003 AGU program, show that the ratio of POM to nss is 8.8 for large sections of the US eastern seaboard for large periods of time. This is not a unique event, and may not even be

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

an exceptional case, where regional haze is driven by organics. Recently published lab studies by the first author of this work and the DeMott and Tolbert groups show the non-negligible effect of heterogeneous inclusions and organics on phase. This is the state of knowledge of atmospheric aerosols. It is not described in this paper.

It was not suggested that global models should incorporate single particles as in the authors response. This is obviously beyond the ability of contemporary computers and modelers. My 'comment' concerned the theme of this manuscript: that ammonium-sulfate-nitrate alone give an accurate knowledge of tropospheric aerosol state or further our understanding of the direct aspect of radiative forcing. The authors do not describe what is known about aerosol chemical composition, the effect on phase or radiative forcing, or the limitations of the study to the reader. Instead the authors contend that this manuscript is a 'significant and important increment' forward and that 'it lies within the nexus of global modeling capability, extant quantitative field measurements of chemical composition, and laboratory parameterizations of physical and chemical properties.' Based on the preceding paragraph the first quote is suspect, the later false. Both are misleading.

The authors' initial response seems to indicate they are not receptive to this suggestion but it seems there are two logical ways to improve this manuscript in light of the fact that field and laboratory measurements contradict many of their conclusions:

1. The theme that ammonium-sulfate-nitrate particles are representative of the Earth's troposphere could be minimized and the authors could add a significant section about what is known about aerosol composition and the effect on phase and radiative properties. By 'significant' I would think several pages, not the current paragraph. The present study would be presented as a 'baseline' which could then be expanded to what is currently known about aerosol composition.
2. The authors could withhold this manuscript until they can add 'organic' to 'ammonium-sulfate-nitrate' since it is clear that organics are an equal, if not the dominant, player in phase and radiative properties (a search on the word 'organic' shows only three entries, all in a single paragraph in the final

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

section!). It is not clear, and not described, how organics will affect the conclusions.

This is a well written manuscript and reflects a great deal of work. It may, indeed, be a step forward from previous studies. Unfortunately, it does not reflect the current state of knowledge of atmospheric aerosols. Furthermore, what is not incorporated into the model is not described nor are the effects on the conclusions mentioned. These omissions should be remedied.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5399, 2003.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper