Reply to comment by R. L. Tanner and D. J. Eatough on "Aerosol organic carbon to black carbon ratios: Analysis of published data and implication for climate forcing"

T. Novakov,[1] S. Menon,[1] T. W. Kirchstetter,[1] D. Koch,[2] and J. E. Hansen[3]

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[1] We appreciate the opportunity to reply to comments and concerns raised by *Tanner and Eatough* [2007, hereinafter referred to as TE] on our paper [*Novakov et al.*, 2005]. In the following we address the "major flaws" that they assert.

[2] 1. TE state that our work was motivated by a need to reduce OC/EC ratios to match predominantly urban-based emissions inventories.

[3] Our objective was to analyze a large number of measured OC/BC values, obtained at different locations and published in a variety of contexts. Our main finding is that ambient OC/BC ratios, taken at face value as published, decrease with BC mass concentrations for all locations.

[4] 2. TE claim that we do not consider negative artifact.

[5] We concluded that the positive sampling artifact may, at least qualitatively, explain the OC/BC versus BC trend. We provide proof of this explanation using data from SAFARI 2000, which unequivocally show that the OC/BC dependence on BC concentration observed with uncorrected data is removed with positive artifact-corrected values. Regarding the negative artifact, we stated that the data considered are insufficient to evaluate the effect of a negative sampling artifact on OC/BC ratios.

[6] 3. TE comment that we used predominantly urban emission data for global estimates of the artifact-induced errors in reported OC/EC ratios. This, they think, implicitly assumes that the correction for gaseous organics adsorbed on the filter is the same for urban as for rural.

[7] This inference is incorrect. After saturation of the filter material with organic gases is achieved, the positive artifact diminishes with continued sampling of carbonaceous particles. Thus the magnitude of the positive artifact may tend to be smallest in (urban) areas where carbon particle concentrations are highest, and is certainly not "clearly dependent of the relative amounts...of gaseous organics vis à vis particulate carbon" as TE assert.

[8] 4. TE state that we have made the extraordinary assumption that OC/EC ratios should remain constant during aerosol transport from urban or source-rich regions to rural and background locations.

[9] We make no assumption that OC/BC ratios are constant during aerosol transport from urban to rural areas, nor do we ignore the frequently large contribution of secondary organic aerosols. In the GISS model we account for most secondary OC, which is derived from natural biogenic emissions by assuming it to be proportional to terpene emissions. We report ratios for a variety of locations, both urban and rural, but we do not report data as a function of time after emission. Thus inferences regarding transport or changes of the OC/BC ratio as a function of time since emission cannot be made.

[10] We have shown that OC/BC ratios that can be "substitutes" for the artifact-corrected values. We compared these values with OC/BC ratios calculated from published OC and BC emission inventories. This is important because compiled OC and BC emission inventories and, therefore, OC/BC ratios may be significantly uncertain especially for some global regions.

References

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[1]Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, Berkeley, California, USA.

[2]Center for Climate Systems Research, Columbia University, New York, New York, USA.

[3]NASA Goddard Institute for Space Studies and Columbia University Earth Institute, New York, New York, USA.

J. E. Hansen, NASA Goddard Institute for Space Studies and Columbia University Earth Institute, New York, NY 10025, USA.

T. W. Kirchstetter, S. Menon, and T. Novakov, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA.

D. Koch, Center for Climate Systems Research, Columbia University, New York, NY 10025, USA.

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