**Response to Comments from John Ogren**

We thank John Ogren for his comments, which have helped us to improve the manuscript. Our responses to the specific queries follow below. Our responses are given in blue text.

The PSAP correction equation in the supplemental information was derived and reported in Ogren (2010, Aerosol Science and Technology, 44:589–591). However, the assumption of an inverse wavelength dependence of the light absorption coefficient in equation S1 is unnecessary. To avoid the assumption, the scattering coefficients from the nephelometer should be interpolated to the wavelengths of the PSAP.

In thinking about this paper some more, the assumption that the absorption coefficient and mass absorption efficiency show a 1/lambda wavelength dependence needs to be tested. The 3-wavelength PSAP and 2-wavelength PAS both provide measurements of spectral light absorption that can be used to evaluate the wavelength dependence of absorption and MAE. This wavelength dependence should be reported. What are the implications for the derived BC emission factors if the spectral light absorption coefficients do not support the assumed 1/lambda dependence?

We now cite the Ogren reference, in addition to Bond et al. (1999). We thank John for pointing out this alternative way in which the disparate PSAP and nephelometer wavelengths can be reconciled. In general, we agree that such an approach (adjustment of scattering coefficients) is preferable because absorption is usually a small fraction of the total extinction. However, for many of the plumes here, absorption dominated over scattering, and thus the use of the in situ plume-by-plume scattering coefficients can add uncertainty to the extrapolation. The AAE is, in general, expected to exhibit less variability than the scattering angstrom exponent for signals where the absorption is dominated by black carbon, as is the case here. Thus, we believe that the use of a constant AAE value of 1 to do the adjustment of the PSAP to the nephelometer wavelengths is preferable. However, as is pointed out, it is important to explicitly test this assumption that the absorption follows a 1/lambda dependence. We have examined the AAE values observed in individual plumes and we find that the average value is 1.04 +/- 0.09, i.e. very close to our assumption of unity. Given that the extrapolations involved are small because the PSAP measurement wavelengths are close to the nephelometer wavelengths, this small difference from unity leads to negligible changes. For example, if $b_{abs}$ measured at 530 nm (the PSAP wavelength) is adjusted to 550 nm (the nephelometer wavelength) using an AAE = 1.04 instead of 1, the difference in the adjusted absorption is only 0.14%. To illustrate further the potential uncertainty that could arise from having an AAE not equal to unity for particles in the ship plumes, we have calculated the percent difference in the calculated $b_{abs}$ at 550 nm (extrapolated from 530 nm) from the case when AAE = 1 for the range AAE = 0.7 to 1.3 (Figure 1). The difference at the extremes is only 1.1%, which is much smaller than the absolute uncertainty in the PSAP measurement. Thus, we see that the assumption of AAE = 1 for ship plumes contributes negligible uncertainty to our derived emission factors from this instrument. We have added some of this discussion to the supplemental material.

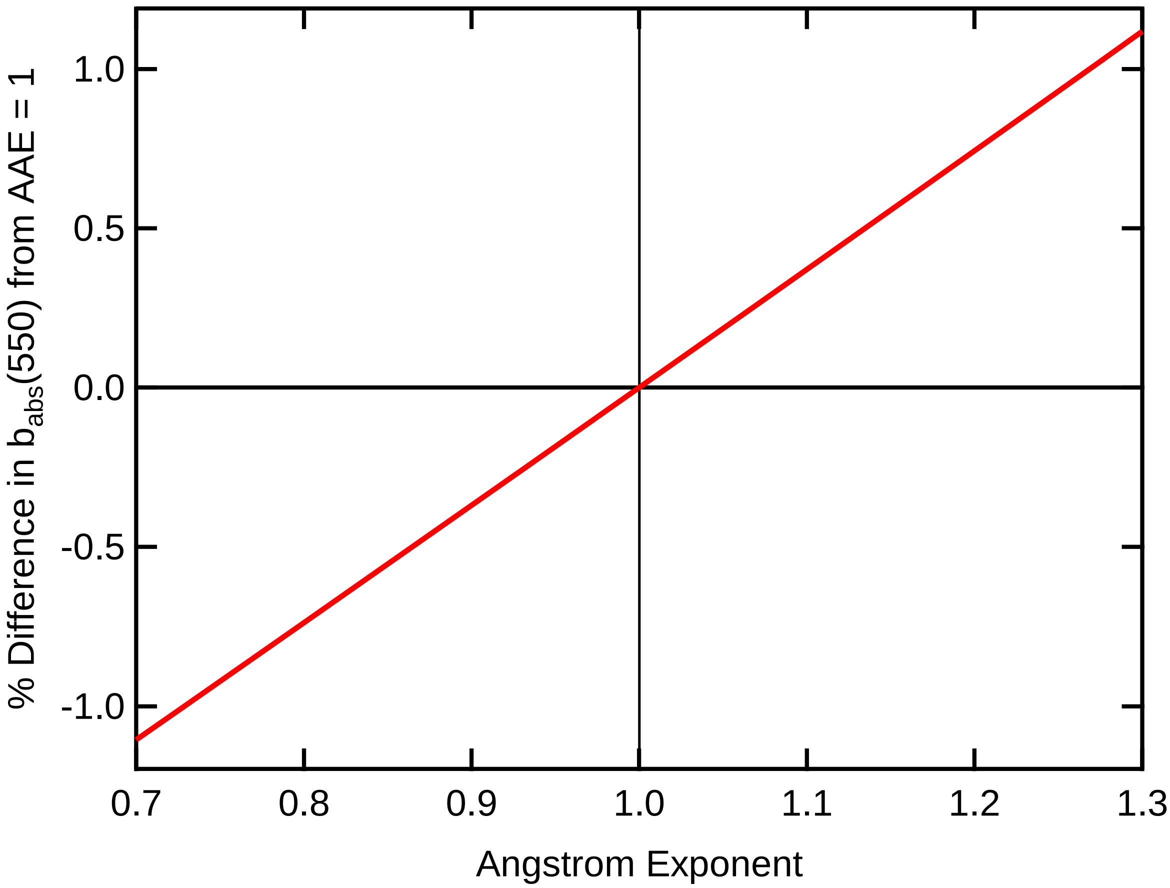


Figure 1. the percent difference in the calculated $b_{abs}$ at 550 nm (extrapolated from 530 nm) from the case when AAE = 1 for the range AAE = 0.7 to 1.3