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# *Interactive comment on* "The role of iron and black carbon in aerosol light absorption" *by* Y. Derimian et al.

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The paper presented is very interesting, although I would like to make some comments associated with the point 4.5 (Empirical relationship analysis) with the intention of improving the empirical relation.

Analysis of the second parameter (a2) of the proposed empirical model (Eq.2) suggest that it has no statistical meaning, the standard error (0.0065) is bigger then the central value (-0.0020), fact that is indirectly referred by the authors in the last comment of the last paragraph "However, it should be noted that the weight of BCe (coefficient a2) is small in this model and any error in the BCe estimate has only a minor impact.", adding to that, the sign of the proposed parameter (a2) is in disagreement with the experimental evidence shown in Fig.7, where the behaviour of the BCe (%TPM) suggest a

positive correlation with the SSA(440)-SSA(1020).

Taking the BCe (%TPM), Fe(%TPM) and SSA(440)-SSA(1020) data information from Fig.7, one can look into the correlation plots BCe(%TPM) vs. SSA(440)-SSA(1020) and Fe(%TPM) vs. SSA(440)-SSA(1020) and realise that the first (BCe) is very noisy with a poor positive correlation (0.59) and the second (Fe) shows a nice negative correlation (-0.85).

Considering now a small modification on the proposed empirical model (Eq.2) by removing the intercept parameter (a3) - we assume that if there is no aerosol species of BCe and iron the SSA difference due to these species should be statistically zero. Applying now the multivariable regression analysis, to this modified empirical model, one gets a1= -0.0295+-0.0050 and a2=0.0166+-0.0032 (+-Standard Error), both statistically significant, with a fitted correlation coefficient of 0.78 and a standard error of 0.032.

This modification shows consistent signs to the Fe parameter (a1) and also to the BCe parameter (a2).

Applying now this modified model, to the information available in Table 1 of the paper, one gets the following estimations: (2.8+-1.9); (2.5+-1.9); (3.5+-1.9); (4.5+-2.0) and (5.5+-2.1) from top to bottom of the table. The standard errors associated with the estimations are bigger then the proposed from the paper approach and the two last values, although comparable inside the error bars, are more far apart from the literature ones. In this analysis one must take in consideration that the proposed modification:

- has one less parameter (increase the errors);

- is sensitive to the BCe (%TPM). By using the literature values of Fe(%TPM), presented in table 1, and estimating the BCe(%TPM) from the model one obtains: for the first (top value) 2.1 in agreement with the assumed 2 used in the calculation; for the second and third there are no Fe literature values; for the forth and fifth the es-



ACPD

7, S2527–S2529, 2007

timated values of BCe(%TPM) are, respectively, 1.1 and 0.1, very different from the assumed value of 2 used in the calculations (responsible for the bigger central values estimations).

- is more consistent with the experimental observation (better application with the correct assumptions);

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7, S2527–S2529, 2007