

***Interactive comment on* “Relating aerosol absorption due to soot, organic carbon, and dust to emission sources determined from in-situ chemical measurements” by A. Cazorla et al.**

Anonymous Referee #2

Received and published: 26 March 2013

The paper is of high scientific interest. It provides a new methodology to estimate chemical composition of aerosols based on the measurement of optical properties. Although the present method may have some limitations, as stated by the authors, it is of high interest for climate aerosol research.

Some questions: Which are the criteria for choosing 1.5 SAE as the limit value for Coated large and EC dominated particles? (Figure 1). Is there any reference in the literature for this? Which are the criteria for choosing 1.5 AAE as the limit value for Dust / OC/Dust / OC dominated and Dust/EC /mix / EC/OC mixt? (Figure 1) Figure 1. The “coated large particles” quadrant in Figure 1 is mainly related to measurements

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carried out at “dust dominated regions”. These regions (listed in Table 2) are mainly located in Northern Africa and Middle East, areas with a high impact of dust storms. Could this association be related to the absorption by free iron present in dust? Figure 1. Biomass burning influenced aerosols are mainly allocated in the finest quadrants (SAE>1.5) whereas “Fossil fuel” related aerosols are concentrated in both (fine and coarse fractions). Is there any explanation for this? Could this be related to the presence of secondary aerosols (mainly scattering) such as sulfate?

I would acknowledge having some more explanation about the ATOFMS results. Which are the negative spectra for primary fossil fuel and for dust? Does the negative spectrum presented in Figure 4 correspond to Primary fossil fuel? Or does it correspond to Secondary fossil fuel? does it correspond to PFF or to SFF? Actually, ATOFMS results are expressed as sources more than as chemical composition. Is it possible to present what is the contribution of the chemical species to the sources distinguished? What is the mean contribution of EC and OC to the FF and BB sources deduced from the ATOFMS?

Page 3465; line 4 delete “the” in “that the those”

Caption from Figure 5. The values depicted in Figure 5 and Table 4 did not refer to chemical composition. The results obtained from ATOFMS are expressed as dominant sources, as deduced from chemical composition. Please, replace “chemical composition” by “aerosol sources deduced from ATOFMS results”.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 3451, 2013.

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