

Interactive comment on “On the effect of water-soluble compounds removal on EC quantification by TOT analysis in aerosol samples” by A. Piazzalunga et al.

Anonymous Referee #1

Received and published: 23 August 2011

This manuscript presents a very interesting and necessary assessment of influence of WSOC on OCEC determination, by comparing the performance of different temperature protocols. The manuscript is clear and well written, and of interest to the scientific community. My main question refers to the extent in which these results are applicable in other European regions outside the Po valley: the authors identify weakly light-absorbing and resilient organics as the cause for the differences between protocols, but how frequently are these species found in other regions? They state that these organic possibly originate from biomass burning, therefore should they also be found in other central and northern EU regions, or are these organics specific to the Po valley? And what about rural sites (instead of urban)? In addition, a very important

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question which arises from reading this MS refers to a potential artefact whereby EC is overestimated by low temperature protocols: do the authors believe that EC and OC measured by what they call lower temperature protocols are systematically biased in the EU regions where these protocols are applied (for urban aerosols)? And in rural sites, do the authors believe that the low temperature protocols should be used for the analysis of samples collected at rural sites?

Specific comments: - page 19853, line 7: " a twofold difference", do the authors mean "between protocols"? - page 19855, line 21: why did the authors not use the original NIOSH and IMPROVE protocols, and instead use similar ones? What was the purpose of using proxy protocols? - page 19856, line 10: how many replicates were analysed of each type? . page 19856, line 21: I assume that the minimum amount of water was used in order to minimise dilution of the WSOC concentration, correct? Please add a sort sentence to clarify this. - page 19858, line 15: "EC>15", this is also a specific characteristic of the EUSAAR protocol, which was designed for regional background aerosols and not for urban ones. How different would the authors expect their results to be if their study had been carried out with rural background aerosols? What would the impact of lower EC loadings be on the washing procedure and on EC and TC determinations? And what about the different types of organics found in regional background aerosols when compared with urban (and heavily polluted) aerosols? It would be interesting for the authors to include a new paragraph/section on the impact of having selected urban aerosols instead of regional background ones for their study, what differences would be expected? - page 19859, line 1: the differences were unfortunately not much lower, $y=1.12x$ to $1.42x$ for washed samples, vs $y=1.06x$ to $1.59x$ for untreated samples. Please rephrase and possibly discuss further, also on page 19861, lines 20-23. - page 19862, line 27: all samples were mixed, to obtain 1 single sample? This is what I understand from the text, but cannot be sure. Please clarify. - page 19862, line 22: once again, the analysis is too interesting to be limited to the Milan aerosols: how would results differ at a rural site, or at an urban area outside the Po valley? How frequent are these weakly light-absorbing and resilient organics in other EU

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regions? If they possibly derive from biomass burning as stated by the authors, are they specific of this region, or of these pollution levels? Would the authors expect to obtain the same results if their methodology had been applied to samples from Switzerland, or from Spain? In addition, as stated by the authors, the presence of organics in the He870 temperature step has a large influence on OCEC determinations and results in an artefact whereby EC is overestimated (using low temp protocols): it would be useful to know the authors' opinion on the geographical extent of this artefact. Do they think EC is being systematically overestimated in EU, where low temperature protocols are currently being applied? - page 19863, line 12: what is the equivalent of these surface concentrations in $\mu\text{g}/\text{m}^3$? - page 19864, line 15: what about refractory OC? can we consider that it is fully independent of the protocol? - page 19865, line 16: "in untreated samples", please add "in urban samples from the Po valley". Otherwise this statement does not apply to all types of sites (e.g., rural) and it cannot be generalised. - page 19865, line 25: "was ascribed to the carbon fraction" please substitute with "was ascribed to a fraction of the carbon fraction" (not to the entire fraction). - table 1: the authors could add "NIOSH-like" and "IMPROVE-like" as a footnote for columns He870 and He580.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19851, 2011.

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