

Interactive comment on “Chemical characterization of submicron regional background aerosols in the Western Mediterranean using an Aerosol Chemical Speciation Monitor” by M. C. Minguillón et al.

Anonymous Referee #2

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In this manuscript, the authors report on 2-month field campaign deploying an ACSM and MAAP and describe their measurements against mass, organic carbon, and elemental composition obtained with collocated PM1 filter measurements. After describing the choices for constrained and unconstrained parameters, the results of the ACSM with respect to organic aerosol fraction, speciation, and sources for the region are discussed. The authors synthesize a large quantity of information and present new and interesting evaluations for the ACSM. The basis of the work is of sound quality and the topic is relevant for readers of Atmospheric Chemistry and Physics, and is therefore

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recommended for publication. There are several points which are recommended for consideration before publication.

General comments:

Can the RIE and CE be assessed independently of one another? In the case of external mixing, the acidity-corrected CE may not apply to that of organics (as reported by Hawkins and Russell, 2010), and quartz fiber filters are known to have adsorption artifacts (though this would not help the argument of extremely high OA/OC ratio).

Hawkins, L. N., L. M. Russell, D. S. Covert, P. K. Quinn, and T. S. Bates. “Carboxylic Acids, Sulfates, and Organosulfates in Processed Continental Organic Aerosol over the Southeast Pacific Ocean during VOCALS-REx 2008.” *Journal of Geophysical Research* 115, no. D13 (July 2, 2010). doi:10.1029/2009JD013276.

Is the ACSM PM1 + BC expected to match the PM1 so well (slope ~ 1)? I.e., was there indication of the level of mineral dust in the PM1 samples with the ICP-MS?

An approximate OM/OC ratio for ACSM alone can be calculated independently of the filter OC based on the parameterization of Aiken et al. (2008) assuming the same instrument response; it may be worth discussing ACSM OC vs. filter OC or ACSM OA vs. filter OA to focus the problem on the sampling artifacts.

As pointed out in Canonaco et al. (2013) and others, the apportionment of HOA, OOA, BBOA, etc. may be sensitive to the constraints imposed by the matrix decomposition. As pointed out by reviewer #1, it would be relevant to discuss the ME-2 solutions and potential uncertainties in the reported values, or discuss ranges which have been reported in the literature such that it is clear which conclusions are robust and which are subject to the assumptions of the decomposition.

Minor comments:

The authors do not mention the f60 ratios of the BBOA factors of the wildfire period.

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Figure 2. The authors may wish to write the equation $y = a + bx$ in the caption such that parameters "a" and "b" in the panels can be interpreted as intercept and slope.

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