

Interactive comment on “Trends of particulate matter (PM_{2.5}) and chemical composition at a regional background site in the Western Mediterranean over the last nine years (2002–2010)” by M. Cusack et al.

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Thank you for your comments. I agree that they will improve the quality of the article. In order of your suggestions the article has been corrected thus:

Abstract: Page 10996, Lines 12-13: It would be useful for reader if the manuscript supplies percentage of decrease (as a range) in PM_{2.5} over Europe during the study period after the words ‘varying degrees’.

New text: Page 10996, Lines 12-13: “Reductions in PM_{2.5} were observed across all

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stations in Spain and Europe to varying degrees (7-49%).”

1. Introduction: Page 10997, Lines 11: Please give the concentration ($\mu\text{g m}^{-3}$) for PM_{2.5} limit value established by EU directive.

New text: “The directive 2008/50/EC establishes limit and target values (annual average of 25 $\mu\text{g m}^{-3}$) for ambient air PM_{2.5} in all member states of the European Union (EU).”

2. Methodology: Page 11000, Lines 25-28-11001, Lines 1-14: It would be interesting for reader to have information about blank contributions from quartz filters for OC/EC, water soluble ions and particularly major/minor elements.

New text: “All analyses and results were blank-filter corrected following the same methodology. For each set of ten filters, nine were sampled and one was reserved for blank analysis. The corresponding blank filter was analysed using the same procedures described for OC/EC, water soluble ions and for major/minor elements. Blank concentrations were subtracted from the total concentration measured for each sample, thus giving ambient concentrations.”

3. Results and Discussion: 3.1 Mean PM_{2.5} levels: Page 11003, Lines 3-8: Please write a short explanation about possible reasons of observed difference among the RB sites across Europe.

New text: “Climate conditions are likely to influence PM_{2.5} levels at each of the RB stations mentioned, whereby differences in precipitation levels and prevailing wind systems could account for the differing concentrations observed, especially for Atlantic and Scandinavian countries. Anthropogenic influences are likely to be most prevalent in Ispra in Northern Italy, as it is subjected to intense episodes of pollution owing to thermal inversions in winter and emissions from nearby heavy industry in the Po valley (Van Dingenen et al., 2004). High pressure weather systems over Eastern Europe in winter can lead to stagnant conditions across Austria and Switzerland, causing the

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accumulation of pollutants (Barmpadimos et al., 2012). Furthermore, the regions can be affected by long range transport of pollution from central and Eastern Europe, and biomass burning emissions in winter.”

3.3 PM Speciation: Page 11006, Lines 12-13: 19% of the observed PM_{2.5} mass is found to be as unaccounted and this portion ($\sim 2.4 \mu\text{g m}^{-3}$) of PM_{2.5} mass is related to water retention on Quartz filters. Contributions on observed PM_{2.5} mass are calculated applying mass closure. A number of researchers in the are have shown that mass closure approach exhibits the largest unidentified fraction compared to APFA and PMF. This discrepancy has been attributed to its simplicity and lack of its ability to extract additional aerosol sources. In addition to water retention on filters please consider these peculiarities of mass closure.

New text: “Usually, a simple mass closure approach yields a larger unidentified fraction compared to source receptor modelling such as PMF. This discrepancy has been attributed to its simplicity and inability to apportion the water mass to different source contributions.”

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