

Interactive comment on “Aerosol sources and their contribution to the chemical composition of aerosols in the Eastern Mediterranean Sea during summertime” by J. Sciare et al.

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At the end of the review process the authors of this paper submitted a revised version of their manuscript to take account of the referees comments (as already published in the form of "Interactive Comments" on the Atmospheric Chemistry and Discussions website). This revised manuscript was returned to the referees for their further comment, but their assessment of the paper was (as before) entirely split. In the interests of full transparency of the review process, I summarise below the additional comments that were elicited.

It is my view that the paper does indeed include a significant new body of information, from an important region, and from one where there have been relatively few prior stud-

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ies. As such it is a valuable addition to the knowledge base on sources and transport of aerosol pollution within the eastern Mediterranean region. The authors interpretation of their data appears sound and defensible. I have, therefore, accepted this paper for publication. Nevertheless, some points of disagreement persist between the second referee and the authors, and these are detailed below.

Further comments from Anonymous Referee #1:

In light of the revisions in the manuscript and the responses to the referees, I think the paper is very suitable for publication. The authors took all of my comments into consideration and made revisions accordingly. They did a very good job of replying to the adverse referee as well. I agree with the authors that faster time resolution sampling enhanced rather than detracted from their results. They had plenty of signal so it did not compromise their uncertainty and it allowed them to see air mass changes that occurred on the order of hours. In addition, I think the comparison with the EMEP inventories was appropriate even though time scales of the model and the measurements were different. The authors have clarified their intentions with the comparison adequately. In summary, I support publication of the paper at this point.

Further comments from Anonymous Referee #2 (edited):

My general assessment has not changed much after the authors' reply. My major concern is still that aerosol chemistry does not change every 2 hours to produce an independent set of data for a month. What the authors have referred to as abrupt changes over this short time-scale concerns gases or the number concentrations of particles, as shown by a CN-counter. These species contribute very little to the mass of the particles which is dominated by the accumulation mode and coarse aerosol. The former - in which most nss-SO₄ and BC are found - are unlikely to produce noticeable changes within the combined uncertainty range of sampling and analytical measurements every two hours.

Significant change in chemistry is expected with large synoptic events, which are not

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the case here. For some of my questions the authors gave exhaustive answer (e.g. role of sea salt in AOT) and have shifted the focus of their paper to less critical issues. For example, in their reply to my comments they argued strongly for the clear diurnal changes in $\text{nss-SO}_4/(\text{nss-SO}_4+\text{SO}_2)$ ratio (page 1295, line 15-22) (even presenting a set of results to support their point), but in the revised version they have withdrawn one complete paragraph and replaced it with a "neutral" statement. My conclusion is that albeit the paper presents a large body of measurement data which might be useful in atmospheric chemistry, it clearly does not represent a significant scientific contribution to the field.

Reply from N Mihalopoulos on behalf of the co-authors (edited):

A careful look of our reply or even at the manuscript shows that we never used number concentrations of particles (obtained using a CN counter) to explain the abrupt changes in meteorology observed during the campaign. Also we don't see the relation with the mass of the particles. Again this subject (the mass of the particles) is not treated in the manuscript.

At a receptor site far from the sources (as in our case) and especially during summer (absence of precipitation), transport and not chemistry is expected to be the main parameter which will drive the levels of aerosol species. During the campaign Rn222 activities were closely monitored and used to illustrate changes in transport conditions (the authors provided a figure here but, unfortunately, it is not presently possible to reproduce figures on the ACPD website - Editor). The very important variability in Rn222 activities observed during the campaign is indicative of important short term changes in transport conditions. As also shown in the figure, 24h average fails to reproduce the variability of Rn222 during the campaign.

In conclusion we totally agree with the reviewer that no changes in aerosol chemistry occur within 2 h. However the important variability in Rn222 activities indicates important transport changes within 2h. Since the sulphur and BC sources in the Mediter-

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ranean are far to be uniformly distributed (seasalt, DMS, industrialized N Europe, N. Africa) and strongly dependent on sector origin, changes in transport will strongly influence both S and BC levels. The best example is the very good covariation between Rn and SO₄ during the campaign indicating strong dependence of S levels on transport (again a figure was supplied but cannot be reproduced here - Editor). Thus our data set is clearly independent and by no means is the observed variability due to an analytical accuracy.

We are happy the reviewer agrees with our answer as presented in the reply. We removed the stated paragraph because we would like to give the article a more §transport and sourcesŦ orientation than chemistry. Although there is no page limited we found that our article was already quite long. However we have nothing against to re-address this point and even to put a figure to better persuade the reader.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1287, 2002.

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