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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mesoscale modeling of combined aerosol and photo-oxidant processes in the eastern Mediterranean" *by* M. Lazaridis et al.

M. Lazaridis et al.

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We would like first to thank the anonymous referee for his extensive and constructive comments. We appreciate the points raised by the Referee that the "the paper presents novel work. . .for the eastern Mediterranean". Indeed, in our knowledge the current modeling application is one of the first ones to apply a mesoscale air quality model in the Eastern Mediterranean and to compare the modeling results with field data.

General Comments

We have to note that the application of the UAM-AERO and the RAMS models is not a trivial modeling task since it involves a major work to simulate the atmospheric dynamics in 5×5 Km^2 grid. In all similar mesoscale applications the modeling period is limited to few dates (e.g. Lurmann et al., 1997). We have chosen 2 periods (13–16 July 2000, 26–30 July 2000) during the summer measurement campaign. The second

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period coincides with the use of the research vessel measurements and the first with meteorological conditions which dominate the regional transport in the domain. Therefore, the selection of the modeling periods was not arbitrary and was done since these were the most “interesting” periods to study.

The specific objective of the current modeling work is mainly to evaluate and assess the importance of the local sources versus the transport component for the ambient concentration of the photochemical pollutants and fine particles in the eastern Mediterranean area. Another objective is the importance of the natural sources for the concentration of the particulate matter and ozone. The comparison between experimental field data and modeling results is aiming to verify the model applicability in the area under study. The above facts also reflect the selection of the 2 periods during summer. During the winter campaign we have modeled the whole period since it was just few days.

The current paper presents an application of the UAM-AERO model combined with the RAMS meteorological model. The sensitivity of the model and the model uncertainty has been studied in the scientific literature and is not part of the current work. The paper by Lurmann et al. (1997) (and the References herein) serves the purpose of model evaluation. In addition, the accuracy of the measurements were not presented since this is the aim of the paper which presents the measurements. The paper by Smolik et al. (2003) is a published work concerning the measurements and information on the impactor measurements can be found.

Comments on the model treatment of emissions

1. Indeed a detailed discussion of the chemical scheme and the emission inventories for biogenic compounds is not presented. A short discussion in the section 2.3 for the ozone sources will be added in the revised version of the manuscript.

   However, the limitations and sensitivity of the chemical scheme used in the UAM-AERO model is beyond the objectives of the current paper. The CB-IV mecha-

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nism is a well known, documented, tested and applied in several applications in the scientific literature.

2. A detailed description of the UAM-AERO model modules is given in the paper by Lurmann et al. (1997). We will refer to the paper by Lurmann et al. (1997) in the revised version explicitly concerning the deposition routines. The model is run for each period separately. Therefore 3 different modeling periods have been initialized and the run has been performed for the periods mentioned.

3. The emission inventories for crustal dust is a scientific area under study and the general conclusion in the scientific literature is that under-prediction occurs. The tables which the Referee points refer to average values and no certain conclusions can be drawn from there. However, I agree that the paper must state the facts about the comparisons in Tables 1–2 and this will be included in the revised manuscript.

4. A detailed description of the UAM-AERO model modules is given in the paper by Lurmann et al. (1997). We will refer to the paper by Lurmann et al. (1997) in the revised version explicitly concerning the gas-to-particle conversion routines.

5. Further statistical analysis is beyond the scope of the current paper. However, we will attempt to discuss the reasons for the discrepancy between modeled and measured data for specific dates.

6. Concerning the comparison between ozone modeled and measured values the comparison is satisfactory. This is stated based on the fact that in general air quality models with agreement with measurements close to 10–20 ppb are considered satisfactory. In the revised version of the paper we will add 1–2 sentences discussing the deposition/emission modeling facts.

7. We will rephrase the model/measurement comparison discussion to reflect the Referee comments.

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Interactive Comment

8. In the revised version of the manuscript we will add a similar Figure such as Figure 7 for the boat measurements. The only concern is that the paper will get longer.

9. I agree with the Referee that the comparison of the measured meteorological data with the RAMS model is an interesting work but beyond the focus of the current paper.

Technical corrections

The technical corrections will be implemented in the revised version of the manuscript. We want once again to thank the Referee for his detailed reading of the paper.

Sincerely,

Mihalis Lazaridis

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5455, 2004.