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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol characterization in Northern Africa, Northeastern Atlantic, Mediterranean Basin and Middle East from direct-sun AERONET observations" *by* S. Basart et al.

Anonymous Referee #1

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Review of the manuscript with MS-NR: acpd-2009-35, Aerosol characterization in Northern Africa, Northeastern Atlantic, Mediterranean Basin and Middle East from direct-sun AERONET observations by Basart et al.

The paper presents the application of recently introduced Gobbi's graphical method for the classification of aerosol properties, using climatological sumphotometric data from AERONET stations in Northern Africa, Northeastern Atlantic, Mediterranean Basin and Middle East. With this method it is possible to separate the AOD growth due to fine mode aerosol humidification and/or coagulation, from AOD growth due to the increase

in coarse particles or cloud contamination. The authors examine additionally the seasonal behavior of aerosol properties, which, in conjunction with Gobbi's method, results in a better aerosol size classification in each region of the study area. A large amount of sunphotometric data is used within this study (39 AERONET stations), the paper is well written and the results are clearly presented. Additionally, the authors present a remarkable literature overview related with the regions under study, in their attempt to relate their conclusions with previous published work. In my opinion, the method is robust indeed, providing however, only a generic presentation of the aerosol "size-related" properties for a region. This is exactly the intension of the method application in the work of Gobbi et al., (2007) and in the present study, and for that, the method is valuable. However, sentences like aerosol characterization should be "weighted" in the text in relation to the aerosol size. To fully characterize an aerosol load, one need to know the aerosol size distribution and the refractive index and so on the aerosol absorption. Gobbi's method refers to a specific, constant refractive index and additionally, assumes only bimodal size distributions. From the point of view of scientific communities working on aerosol characterization in terms of the measurement/retrieval of the size distribution and refractive index, the method could be only used as a "quick-look" of the aerosol burden over a region. Further measurements are needed to characterize and discriminate the aerosol type, mixing state, vertical distribution, absorption and so on. I recommend publication of the paper as it is, with the following additions in bibliography for: Central Mediterranean: Page 7722, line 15: Mona, L., A. Amodeo, M. Pandolfi, and G. Pappalardo (2006), Saharan dust intrusions in the Mediterranean area: Three years of Raman lidar measurements, J. Geophys. Res., 111, D16203, doi:10.1029/2005JD006569 Eastern Mediterranean: Page 7722, line 22: Kazadzis, S., A. Bais, V. Amiridis, D. Balis, C. Meleti, N. Kouremeti, C. S. Zerefos, S. Rapsomanikis, M. Petrakakis, A. Kelesis, P. Tzoumaka, and K. Kelektsoglou, Nine years of UV aerosol optical depth measurements at Thessaloniki, Greece, Atmos. Chem. Phys., 7, 2091-2101, (2007) Amiridis, V., D. S. Balis, S. Kazadzis, A. Bais, E. Giannakaki, A. Papayannis, and C. Zerefos, Four-year aerosol observations with a Raman lidar at Thessaloniki,

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