Atmos. Chem. Phys. Discuss., 11, C8516–C8518, 2011
www.atmos-chem-phys-discuss.net/11/C8516/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol shortwave daily radiative effect and forcing based on MODIS Level 2 data in the Eastern Mediterranean (Crete)" *by* N. Benas et al.

Anonymous Referee #1

Received and published: 3 September 2011

The paper represents an interesting contribution to the atmospheric aerosol topic and particularly to the evaluation of the aerosol radiative effect and radiative forcing. The results obtained are relevant to the field. The applied methodology is really interesting and applicable to studies in other regions different than that selected for this study.

I have some comments concerning some points of the paper that will require additional clarification.

In page 19886, lines 13-16, there is a statement that seems a little bit confusing, likely the authors refer to the aerosol radiative effect no to the aerosol optical depth, otherwise the statement is incorrect.

In page 19888 there is a presentation of the main quantities analyzed in this study. The presentation seems a little bit confusing. The computation of the SW DRE requires the computation of the net SW irradiance at a given level both with aerosol and without them. But in the text is seem that F refers to the irradiance in a given direction (downward or upward). So this part of the manuscript requires some rewording stating correctly the definitions and solving the apparent incoherencies related to equations 1 and 2 and to the statement on lines 27-28. The authors must also take into account that the quantities they use and that they measure in Wm-2 are not fluxes but irradiances or alternatively density fluxes.

In page 19888, lines 8-11, it would be necessary to describe the procedure the authors compute the daily values from the available information. A relevant point would be to mention if in order to compute the average daily irradiance they consider 24 hours period or daytime period.

In pages 19888 and 19889 the authors mention the use of AERONET data on single scattering albedo. It would be necessary to mention the limitations associated to the retrieval of this variable using the AERONET retrieval procedure and the data quality criteria applied in AERONET.

In page 19889, lines 14-16, it is necessary to describe the procedure used in the determination of the water vapour content from the experimental data and to give information on the uncertainties of these data.

In page 19891, lines 11-16, the mention of the extrapolation and interpolation procedures requires some comments on the uncertainties associated to these computations, especially in the case of extrapolation.

The authors compare there computations of DSR with measurements at HCMR and Finokalia stations, so it would be necessary to give some details about the instruments used for measuring these data and to present an estimation of the experimental uncertainties.

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In page 19895, lines 13-17, it would be worthy to present some comparisons with results obtained in other studies.

In table 5 the number of decimal figures is excessive as far as one considers the uncertainty of MODIS data.

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