

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.

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We would like to thank the Referee for the suggestions and corrections. All comments and recommendations have been taken into account. Please find our point-by-point reply below.

GENERAL COMMENT: Based on the comments regarding the validity and reliability of the results, which were evaluated on a mean daily basis using MODIS data acquired at a specific time of the day, we have repeated our calculations for the specific satellite overpass times, instead of the mean daily. All results reported in the revised manuscript are based on these new calculations.

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"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."

The statement refers to aerosol absorption and scattering optical depth, which are evaluated using the total aerosol optical depth provided by MODIS and the single scattering albedo data from AERONET station. The term "absorption and scattering optical depths" has been added to the statement, to clarify this point (Page 4, line 31).

"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 it seems 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."

Model output includes both the surface downwelling radiation (DSR) and the net DSR. The latter is computed using the former and the surface albedo. The DRE is calculated for both these quantities, using the method described in Section 2. Regarding the terminology, we understand the point of the referee. The terms "radiation flux" and "radiation flux density" are both used in the literature, having the same meaning with the term "irradiance" (e.g. Vardavas and Taylor, 2011, p. 59).

"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 the revised manuscript, all computations are performed for the specific satellite over-

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pass time (separately for Terra and Aqua satellites), instead of a mean daily basis.

"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."

A description of the uncertainties and limitations in single scattering albedo retrieval using the AERONET procedure has been added in Section 3.4 (Page 9, lines 24-28).

"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."

The procedure used for the determination of the water vapor content is described in Section 3.1 of the revised manuscript (Page 8, lines 3-9).

"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."

Comments and uncertainties in the interpolation and extrapolation procedures have been added in Page 10, lines 3-10.

"The authors compare their 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."

A description of the instruments and the measurements uncertainty has been added in Section 4.2 (Page 12, lines 14-18).

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

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In the revised manuscript we have added more bibliography and comparisons in Section 4.3 (Page 15, lines 8-15).

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

The decimal figures in Table 4 of the revised manuscript have been corrected.

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