

Interactive comment on “Direct SW aerosol radiative forcing over Portugal” by D. Santos et al.

D. Santos et al.

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L. Alados-Arboledas

Comment to L. Alados-Arboledas's comments

Main comment

As explained in the specific comments, the authors decided to include the surface DSWARF results in this paper, for specific situations. The temporal periods covered by the study was added to the abstract, as well as the coordinates of the study areas.

Particular comments

Section 2. The authors agree that the reference to Fig. 1 was misplaced therefore the reference to Fig 1 is now inside sections 2.3 and 2.4, where the methodology is explained.

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Section 2.2 The model used in HYSPLIT was added in section 2.2.

Section 3.5 The AERONET level 1.5 data are not quality assured, since it can be cloud contaminated, but additional information from satellite data give us the confidence of clear-sky days. On the other hand, the AERONET level 2.0 must be used with caution if one wants to study Desert Dust events because it might filter, some ’aerosol interesting’ data. Therefore, these two reasons justified the choice of the authors to use AERONET level 1.5.

P-8598-9599 The aims of this paper are twofold: the assessment of the surface spectral reflectance over two regions of Portugal, having different vegetations cover types, but homogeneously distributed; assessment of the DSWARF over these two sites for two main types of aerosol events, being these sites, spatially apart by about 150km. In this sense it is worth to evaluate the effect of the same aerosol event (Desert Dust - DD) over the two separate sites and the effect of the time evolution of the same aerosol type (Forest Fire - FF) over the same region. These two situations have direct impact on the DSWARF at the TOA, at the Surface, and, consequently, of the entire atmosphere. This fact justifies the choice of the authors to estimate the DSWARF at the Surface as well, only for these two particular situations (presently Figure 13b). The calculation of the DSWARF at the surface for all the cases under study would mean an additional effort and would imply an increase of the number of figures and text. Therefore, the authors choose to present the results only of the two above mentioned cases (DD over two separate sites and FF over the same region).

Section 3.2.1 No low AOT values are used in this work, since, for the majority of aerosol situations, AOT0.55 is always higher then 0.30. On the other hand, SSA values, shown in former figures 10, 12 and 14, are not obtained directly from AERONET, but are calculated from MIE theory using the spectral complex refractive indexes and aerosol size distribution values obtained from AERONET ground based observations over Évora and Cabo da Roca. However the spectral values obtained by the others are in good agreement with AERONET SSA data (<http://aeronet.gsfc.nasa.gov>) within the same

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spectral range.

P-8600 It was rephrased in the manuscript.

P-8600 – L-17. The day 19 June was removed since it was a mistake.

Section 3.2.4 In former figures 16 and 17 only DSWARF negatives values are considered. Following the suggestions of the reviewer additional comparison with other authors is made on the 2nd paragraph of section 3.2.4. The comparison with other authors, especially in the case of studies in close regions, under similar aerosol types, was made and added to section 3.2.4. However, one should note that the spectral region considered by these authors differs considerably from our case; moreover, the values presented by these authors were daily averaged whereas ours are instantaneous and need to be averaged assuming a constant DSWARF during the diurnal hours; the definition of our DSWARF at TOA and at Surface followed the one described by Ramanathan et al.(2001) being distinct from the definition of DSWARF used by the authors analysed.

Ramanathan, V., Crutzen, P. J., Kiehl, T., and Rosenfeld, D., Aerosols, Climate, and the Hydrological Cycle, Science, Vol. 294. no. 5549, pp. 2119 – 2124, 2001.

Minor comments

P.8587_L-25: It was replaced.

P.8594_L-24-25: The sentence was rephrased.

P.8597_L-13: It was replaced.

P.8598_L-18-19: It was replaced.

Figure 17: It was corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8585, 2008.

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