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Comment

Interactive comment on “Estimation of the aerosol radiative forcing at ground level, overland, and in cloudless atmosphere, from METEOSAT-7 observation: method and first results” by T. Elias and J.-L. Roujean

Anonymous Referee #1

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Estimation of the aerosol radiative forcing at ground level, over land, and in cloudless atmosphere, from METEOSAT-7 observation: method and first results T. Elias and J. Roujean

The main goal of this work is to study aerosol radiative forcing using geostationary satellite observations, over land and in cloudless atmosphere. This is an actual topic because it is necessary to decrease the uncertainties associated to the role played by

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the particle matter suspended in the atmosphere on the energy balance in the Earth-Atmosphere system, both in a global and regional scale.

It is an appropriated topic to ACP where the authors present interesting results about a new methodology to estimate the aerosol radiative forcing, based on the METEOSAT-7 data, which scan Europe and Africa on a half-hour basis. All sections are well organized and the data have high quality and are enough to support the interpretations and conclusions.

I think that the paper is acceptable with minor corrections, as I comment below.

1. In the abstract the ARF acronym is not defined.
2. Point 2. Downwelling solar radiative flux.

In figure1, letters 'a' and 'b' should be included to a better identification of them.

In the last paragraph, the authors give values of the slope of the ARF versus the AOT (the radiative forcing efficiency), so I think that these magnitudes must be given by unit of AOT (Wm^{-2}/TOA).

3. Point 3. The method.

The bases of the employed method to analyse the satellite data have been developed in the context of the operational FP/6geoland project, (Elias and Roujean, 2006), and it is based in the angular dependence of the TOA signal. I think that this is a very important point in the paper, so additional information could be given to help the reader to understand this strategy. Furthermore, if the ATBD [Elias and Roujean, 2006] is available via web, the internet address could be given.

Additional information about the used scheme to define the atmosphere structure to obtain the LUT must be given (type of atmospheres, vertical profiles of gases and aerosols, vertical profiles of radiative properties, etc.). The solar zenith angles for the measure-

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ments used in the work, range from 60 to 70%, how much is the error associated to the 6S outputs due to the considered geometry in the radiative transfer software?

In the last paragraph, first line, it is noticed that dependence of UTVR and, I think that the authors must include a reference about this affirmation because this is a crucial point in the work. How is considered the convolution of the 6S outputs with the transmission function of the METEOSAT-7 channel?

The table 2 is named first that table 1.

How is the aerosol size distribution slope (ASD) evaluated?

I think that additional information about how the SALmax value has been obtained must be given. What is the error associated to this parameter?

Regarding to the cloud screening procedure, the used methodology ensure a complete cloudless sky or only around the sun disk?

Although the DSSF is the magnitude of interest in the work, and for completeness, I think that additional information about the validation of the input variables to the radiative algorithm, i.e. SAL and AOT, could be given. This information can be of interest to determinate the error sources in the DSSF values, and also to evaluate the aerosols radiative forcing efficiency using exclusively satellite data.

4. Point 4. Validation of the method.

In think that the use of acronyms in the title of a point or subpoint must be avoided.

Why the authors have chosen the 7:20 GMT hour to validate the method? Can be the results obtained in this hour expanded to whole day without additional supposes?

Regarding to the point 4.2, ARF validation, the authors said that the agreement between ARFres and ARFmeas is good, how the authors justify this affirmation?

Although in figure 9, it is possible to obtain a regression fit, the dispersion of the data

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is very high, and I think that additional information about the statistic robustness of the fit is necessary (null hypothesis tests).

In the point 4.4 the authors present results of the measured gradient between -40 and 30 Wm⁻². Is this the correct unit, or this magnitude is only a difference per day and not a gradient per day?

5. Point 5. Conclusions.

The OMI instrument it would be mentioned in order to identify UV absorbing aerosols.

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