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Atmospheric Chemistry and Physics Discussions

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

Anonymous Referee #3

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The author’s attempt to increase the amount of information about aerosol effects on surface radiative forcing that can be obtained from historical Meteosat-7 data is a meritorious one, particularly given the current state of our knowledge regarding the aerosol radiative forcing of the climate of the Earth.

The use of a high aerosol loading during the heat wave of 2003 in Europe is a sensible place to start in evaluating whether a single visible broadband channel measurement can provide the requisite information about the surface radiative forcing. The fact that the authors detect a significant signal for this high aerosol load is encouraging and the

radiative forcing efficiency they estimate lies within the plausible range that has been found in more direct ways by other authors (e.g. Redeman et al. 2006).

Clearly the present paper can only be judged on what it attempts and the validation of the method for high aerosol loads is a success. My concern with the method implemented by the authors is that when it is applied over a wider geographical domain and extended period, when aerosol effects are not as large, the assumptions regarding the surface albedo and how it can be estimated will be more severely tested. It is therefore not clear to me that the 20W/mˆ2 uncertainty estimate given is valid for anything other than the case study, when the surface is significantly obscured by aerosols. I would suggest that such a qualification be included in the abstract, so that other interested parties are aware that the question of more global uncertainty estimates has not been thus far addressed.

I would suggest that in future analyses of the coherence in time and space of the variation in the surface radiative forcing be evaluated since although the surface is highly heterogeneous one would expect the aerosol radiative forcing to be less so. That is for a future paper though.

In summary: The paper does address relevant scientific questions that are within the scope of ACP and presents a novel approach to the analysis of Meteosat-7 data. The conclusions reached are substantial, but limited by the scope of the validation sites and period of analyis. The analysis method is clear, but the results must include a caveat regarding their use in making global statements about the validity and accuracy of the method. The use of figures, provision of references and structure of the paper is coherent and easy to read. The minor language errors are of such a nature as to not mislead the reader and are of low enough frequency not to irritate.

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