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Atmospheric Measurement Techniques Discussions

Interactive comment on "Dust impact on surface solar irradiance assessed with model simulations, satellite observations and ground-based measurements" *by* Panagiotis G. Kosmopoulos et al.

Anonymous Referee #2

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General Comments

This is a case study of a dust event that occurred in the Eastern Mediterranean during 30 January and 3 February 2015, and its impact on the solar radiation received at the surface. Used are observations from a variety of sources such as AERONET, MODIS, CALIPSO, a radiative transfer model and a chemical transport model and the 1-day ahead forecasts from the Copernicus Atmosphere Monitoring Service. It is reported that such a dust event can result in attenuation of the global radiation by as much as 40-50%, and a decrease of 80-90% in the direct component.

Specific Comments o The approach used in this study follows methodologies implemented in numerous previous studies on the impact of dust on the reduction of solar radiation at the surface (and/or at the TOA). As such, the results obtained are to be expected. Some references to previous relevant work are included here. o The actual value of the analysis to forecasting such impacts is not obvious since in real time, all the information that was available in this case in hindsight, will not be available in real time. Therefore, such impacts on solar energy planning will have to be estimated from previous knowledge of anticipated reduction. o Since the case was well documented with information from numerous sources (no validation at the surface was attempted), perhaps a brief communication on this case with a substantially reduced number of figures would be appropriate. o The bibliography provided is very selective. Some relevant publications:

a. Tegen, Ina, Lacis, Andrew A., Fung, Inez Nature, 1996. The influence on climate forcing of mineral aerosols from disturbed soils. Apr 4, 380, 6573, ProQuest pg. 419. b. Li, F, Vogelmann AM, Ramanathan V., 2004. Saharan dust aerosol radiative forcing measured from space. Journal of Climate. 17:2558-2571. c. Diaz, J. P., F. J. Exposito, C. J. Torres, F. Herrera, J. M. Prospero, and M. C. Romero, 2001. Radiative properties of aerosols in Saharan dust outbreaks using ground-based and satellite data: Applications to radiative forcing. J. Geophys. Res., 106, 18 403– 18 416. d. Haywood, J. M., P. N. Francis, M. D. Glew, and J. P. Taylor, 2001. Optical properties and direct radiative effect of Sharan dust: A case study of two Saharan dust outbreaks using aircraft data. J. Geophys. Res., 106, 18 417–18 430. e. Kaufman, Y. J., A. Karnieli, and D. Tanre, 2000. Detection of dust over the desert by EOS-MODIS. IEEE Trans. Geosci. Remote Sens., 38, 525–531. f. âĂŤâĂŤ, D. Tanre, O. Dubovik, A. Karnieli, and L. A. Remer, 2001. Absorption of sunlight by dust as inferred from satellite and ground-based remote sensing. Geophys. Res. Lett., 28, 1479– 1482. g. Pandithurai, G., et al., 2008. Aerosol radiative forcing during dust events over New Delhi, India, J. Geophys. Res., doi: 10.1029/2008JD009804. h. Miller, R. L., I. Tegen, and J. Perlwitz, 2004. Surface radiative forcing by soil dust aerosols and the hydrologic cycle, J. Geophys. Res., 109,

D04203, doi: 10.1029/2003JD004085.

Technical Corrections 1. When providing information on outliers, indicate the % of total number of points available. 2. Since the paper deals with the Eastern Mediterranean, examples of CSP installation in that region should be mentioned (instead of a facility in Western Med). 3. Acronym and references should be provided the first time used (e. g., P. 2, L. 25: libRadtran). 4. P. 3, L. 23, stated: "In this paper MODIS Aqua C6 L2 is used". There are differences between Terra and Aqua. Why Aqua was selected? 5. P. 4, L. 19, stated: "The final analysis data (FNL) of the National Center for Environmental Protection (NCEP) are used for the assessment of the meteorological conditions". Later on, on P. 4, L. 27: Stated: "COSMO-ART is a regional atmospheric model which couples online meteorology and chemistry and is used". Some explanation is needed why both are needed. 6. P. 11, L. 28, stated: "Surprisingly, further inland in the Balkan peninsula, where the surface is less affected by the dust plume during the dust event. This means that the interaction of dust particles with the atmosphere leads to a positive feedback on solar radiation at the area north of the plume." The connection between these two statements requires clarification. 7. P. 12, L.17, stated: "This study reconfirms and quantifies high dust aerosol load impact on surface solar radiation." Since this study only "reconfirms" what is already known, it is recommended to condense it to a short communication.

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