

## ***Interactive comment on “Aerosols optical and physical characteristics and direct radiative forcing during a “Shamal” dust storm, a case study” by T. M. Saeed et al.***

**Anonymous Referee #1**

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General

The paper presents the impact of a severe dust storm on the radiation budget. The case occurred already ten years ago and was already presented in the literature. The paper is lengthy and does not contain any new aspect of dust research. The very general way how to use dust optical data to compute radiative properties and fluxes is outlined only. I personally learned nothing from the paper. The only exotic point is the rather high dust load and the corresponding high dust optical depth of 3.7. But does this aspect (already presented in the literature!!) justify publication?

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I vote for rejection.

Some detailed remarks:

1 Introduction:

The introduction is very lengthy, very general, and thus very boring.

No information on important dust field campaigns like 2004 United Arab Emirates Unified Aerosol Experiment (UAE2) or the Saharan dust campaigns SAMUM 2006 and 2008.

2 Study site

The instruments, techniques, models, and corresponding uncertainties should be presented in section 2. I would like to know how one can measure an aerosol optical depth larger than 3 with a hand-held photometer? The uncertainty must be rather high.

3 Synoptic description

The meteorological description is very length and cumbersome (sounds like a field campaign report) and is not needed for the direct radiative forcing discussion on which the paper is obviously focusing.

4 Ground-based versus satellite-based data

Again a very lengthy description of likewise simple observations. But again, no word to uncertainties in the observations of aerosol optical depths around 4.15 with hand-held photometer. One may even speculate, the other way around: May be the aerosol optical depth was 8 or even higher (which fits to visibilities of the order of 300m, dust mass concentrations of about 5000 micrograms per m<sup>3</sup>, and 3-6 km high dust layers), but only AODs up to 4 can be estimated from such questionable photometer measurements.

5 Vertical distribution of the dust layer

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Again a very lengthy discussion of model details which we do not need here in this paper. On the other hand: Models usually do a bad job regarding the vertical distribution of dust outbreaks. How large are the uncertainties in the model results here?

#### 6 Direct radiative forcing

Again: A very lengthy (unnecessary) description of the radiative transfer model and input parameters. Obviously many dust parameters for Saharan dust are assumed, but are the ones for Arabian mineral dust not significantly different from the Saharan parameters (as Schuster et al, 2012, ACP) found?

All in all, even this chapter does not present any new or surprising aspect.

No comparison with all the comprehensive radiation measurements and computations performed in the frame of SAMUM-1 for example.

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