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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Increasing Arabian dust activity and the Indian Summer Monsoon" *by* F. Solmon et al.

Anonymous Referee #1

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Overall this is a potentially interesting and publishable paper with some very strong elements. With a few minor modifications, the paper should be acceptable. In addition, there needs to be much more editing (I include some English errors below, but there are many I didn't highlight here).

Two major points: 1. More comparisons of the dust distribution to observations are necessary. For the dust can you show some AERONET and other in situ comparisons, including size distribution, and seasonal cycle?

2. How sensitive are your results to optical properties and dust size assumptions you are making? Why should we believe your results? Please indicate where your dust optics are from, why they are correct, and show us some more comparisons to convince

us you are doing a good job. Please also add a paragraph discussing optical properties sensitivities and how that might impact your results. Consider Perlwitz et al., 2001, for example, and how different the climate response is depending on small changes in optics.

Minor points: "Comparison of Fig. 2b, d, f and h shows that radiative effects of dust tends to reduce model biases over continental India southern and northwestern regions." This is a really important statement, and yet is very difficult to see in the figures. Maybe add another set of plots which show TRIMM (or PERSIAN or APHORODITE) minus the dust case?

Please consider the possibility of anthropogenic sources varying the sources of dust over this period, and incorporate some of the analysis from Ginoux et al., 2012.

For the Rf, could you please show SW and LW separate? There are observations that suggest that over the North African plume, when over desert regions (bright), there is no net Rf of dust (Patadia et al., 2009). Can you capture this type of behavior? I can't really tell from your net RF that you are getting that in the SW. This is likely very dependent on the optics and size distribution your choose.

"the TOA radiative forcing efficiencies (i.e. TOA normalized by AOD) shows relatively less of a warming e_ect in the Indo-Pakistanese and Northern India desert regions due to lower surface albedo." Where is this? Sounds interesting, please include! (you refer to this later also, on p4890, line 18, so it would help to have the figure).

"Consequently the 2005–2009 pentad (P0509) shows sensibly higher averaged AOD relative to the 2000–2004 pentad (P0004)." Why don't you use more intuitively obvious casenames, like DUSTY and NONDUSTY? You use these later anyway to explain these, and it will make the text easier to follow.

English Edits: "A specific attention" remove "a"

"pretty closely" remove 'pretty' "convective precipitation tend to be inhibited" →tends

“This regional stabilization is induced by a relatively large surface radiative dimming which decreases continental 10 and sea surface temperatures (Fig. 4c), and for which inhibiting e_ect on convection is predominant over dust absorption radiative warming, consistently with a negative simulated TOA radiative forcing (Fig. 4b).” please reword “for which inhibiting effect on convection is predominant” sounds very awkward.

“to shape out regional contrast” out→our?

“Fine dust transported from Arabian, Indo Pakistanese and Iran sources to northern India are relatively diffusive and induce a moderate radiative” how can dust be diffusive? I think you mean small in magnitude or diffuse?? “This, on average, favor a stabilization” →favors “and for which regional impact is diffcult to assess.”→ THE regional impact “Our work 5 hypothesis is that”→workING “strong10 positive trend are” make verb and subject match.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 4879, 2015.