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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The contrasting roles of water and dust in controlling daily variations in radiative heating of the summertime Saharan Heat Low" *by* J. H. Marsham et al.

Anonymous Referee #2

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Marsham et al. detail a very interesting study on the roles of water vapor, aerosols and clouds on the radiative forcing at the top of the atmosphere and at the surface over the Sahara. For their purpose they have used the unique and comprehensive dataset acquired during the 2011 IOP of Fennec in the Saharan Heat Low (SHL) region (so-called BBM supersite) and ERA-I reanalyses from ECMWF. The importance of water vapor in the Saharan region is a hot topic and this study is an important contribution to the subject. Water vapor variability over the Sahara has an influence on the West African Monsoon system across la wide spectrum of scales, from synoptic to decadal.

Overall, the paper is well written and well structured. The paper refers to all the relevant

literature on the topic, to date. I only have small changes and clarification to suggest at this stage. The paper is acceptable almost as it is.

Minor comments

Introduction p 19450, end 1st paragraph: you only are mentioning global operational models. How about mesoscale operational numerical weather prediction models?

Method p 19451: line 8: define GERB p 19452: lines 4-5: the count of days is not good, should be 11 days p 19452: line 5: the count of days is not good, should be 4 days p 19452, sunphotometer: Is there a reason why you do not consider integrated water vapor retrievals from the sunphotometer in BBM? p 19452: line 18: How do you come up with this number, 3 W m-2?

Results p 19453: line 11: How do you define your appreciation of "good surface data"? p 19453: lines 25:-27: I fully agree. Does this mean that the LLJ associated with the harmattan is the mechanism controlling the relationship between AOD and TCWV? Is this how you explain the low correlation of 0.29?

Discussion p 19462: line 5: Up to?

Conclusion p 19464: line 17: How important is it to have an accurate dust aerosol representation in such models? Would a prognostic dust model improve the correlations in ERA-I?

End review

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 19447, 2015.