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Discussions

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Interactive comment on "Regional effects of atmospheric aerosols on temperature: an evaluation of an ensemble of on-line coupled models" *by* Rocío Baró et al.

Anonymous Referee #1

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General comments The article has a very clear objective of evaluating the simulations of coupled models including aerosol interactions with radiation and clouds with respect to surface temperatures. This is clearly of general interest since it is an impact on weather forecasting that may motivate changes in operational models around the world. The improvement of temporal variability is an important result.

The paper is written like a report. There is very little discussion on why given models may perform better than others. There is also a lack of discussion on how well the aerosol concentrations for the two episodes compare with actual observations. The reader is left without means to judge whether this is a convincing case or not. In the conclusions, the authors reinforce this feeling by saying that this evaluation should be

performed for cases with "episodes with stronger effects on the aerosol cloud interactions" and mentioning that in one of the cases larger concentration were found over the Mediterranean Sea where the evaluation in not performed.

The paper also lacks objective definition of some parameters and procedures. The numbers that summarize results should be organized in tables so they can be easily compared.

Specific comments

Page 4, lines 20-23 – please correct sentence structure

Page 35 – Table 1 – define CS1, CS2, DE3, ES1, ES3, in the text you use things like, C11, C12...etc, this should be defined in the text.

Page 6, line 8 you mention annual emissions, what is actually used in a daily/hourly basis? Are these cases significant from the point of view of high emissions and concentration of aerosol over land?

Page 6, line 17. The reference Im et al (2015b) states that the PM values show large underestimations, particularly because of dust and sea salt emissions. In the cases used in this paper, how do this values compare to station data?

Pages 7, Equation 2, objectively define ˆ ; what is the operation defined in eq. 2? What is Vick ?

Page 9, lines 3-5, for the whole period, 60 days in one case and 30 days in the other case? Only in figure 10 the exact period is mentioned. Please state that in the text.

Page 9, lines 6-28 the average numbers of the bias for each case and run should be summarized in a Table.

Page 9 – a figure with the average concentrations of PM should be included to help the discussion on the bias. Visual inspection of figures 1 – 3 shows very similar results and does not help the case of the aerosol effect on temperature. What is needed is

a way to represent the effect on temperature in places where there is a high concentration of aerosol. You could choose a given simulation time with very high aerosol concentrations and show model performance for temperatures.

Page 10-11, the average numbers of the coefficient of determination and improvement or not on standard deviation in the analysis of temporal variability for each case and run should be summarized in a Table.

Page 14, lines 23-26 – for Tmin the case ENS-C13 is perhaps an exception?