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Interactive comment on "Homogeneized modeling of mineral dust emissions over Europe and Africa using the CHIMERE model" *by* R. Briant et al.

Anonymous Referee #1

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The authors present a CHIMERE model set-up that includes a dust production model and can be applied to mineral dust modeling over Africa and Europe. As dust sources over Europe differ from those over North Africa, the authors make use of different input data sets describing the soil erodibility. The authors extensively present a state of the art perspective on dust production modeling (applied to CHIMERE), but unfortunately only very briefly discuss the improvements of the new scheme.

General comments: 1) Many abbreviation used in the manuscript are not introduced and may remain unclear to at least parts of the readers. Please introduce the abbreviations when used first.

2) What exactly do you mean by an "academic test case"? Following the reminder, the "academic test case" is presented in Sec. 2. To me, it rather reads as a summary

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on the "state of the art" of dust production modeling - tested within CHIMERE. Do you mean this by "academic test case"? If so, please clarify at the beginning of the section. Maybe you want to consider renaming this section to be more precise then? Please also consider renaming Section 3 into "Sensitivity study" and omit "academic test case" as this is naming rather confusing.

3) Do you account for changing roughness length due to soil preparation for the agricultural sources? Please comment on this.

4) Sec. 3: How realistic is the assumption of U=14 m/s? Can you comment on this, please?

5) Sec. 4.1: This section is not that easy to follow. The first impression is that WRF, CHIMERE, and GOCART are three models that will be compared. Later it becomes obvious that WRF and GOCART are somehow used to initiate the CHIMERE simulations. So I would like to suggest rewording and restructuring this section. Maybe, start with an explanation that CHIMERE is a model system (or part of a model system?) that requires input fields from global and regional models (?). Also, would not it make sense to have this introduction section on CHIMERE earlier? Furthermore, you may want to consider introducing the AOD measurements as a separate section not called "Model set-up".

6) Sec. 4.2 and 4.3: The discussion of the results is very brief and should be extended. It would also be good if you can provide some implications for the application and use of the updated model version. Otherwise, it's not much the reader gets out here and the conclusion (Sec. 5) that an improved dust production model is presented is not obvious. In particular as you state in that the "differences among the models is small" (P3456, L18-19).

7) Fig. 8 illustrates a di-pol like difference pattern over the southern Sahara. Any explanations for this? Furthermore, there are almost no differences evident over Europe, but you aim at showing that the new extended model performs better over Europe. Can

you explain in more detail how you conclude this?

Specific comments: P3442 L14-15 What do you mean by academic test cases? Do you refer here to the "state of the art" section?

P3442 L13 What does "GARLAP" stands for?

P3442 L24 The paper by Ginoux et al. (2013) provides a more recent view on the global distribution of dust sources and may be added to the reference list here.

P3443 L07 Additionally to the here named studies on European dust emission, there are the studies by Korcz et al. (2009) using a model to estimate dust emission over Europe for different years.

P3443 L09 What's been in the focus of the WELSON project and for what does WEL-SON stand?

P3444 L05 ERS?

P3444 L08 PARASOL? ASCAT?

P 3444 L16-17 Can you provide a reference here, please?

P3449 L21 "Each feature" - which features?

Technical comments: P3451 L06 shows

References: Korcz, M., J.. Fudala, C. Klis (2009), Estimation of wind blown dust emission in Europe and its vicinity, Atmospheric Environment, 43, 1410-1420.

Interactive comment on Geosci. Model Dev. Discuss., 7, 3441, 2014.