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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Evaluating the Relative Importance of Northern African Mineral Dust Sources Using Remote Sensing" *by* Natalie L. Bakker et al.

**Anonymous Referee #1**

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The study is motivated by the question, how much phosphorus is supplied to the Amazon by North African dust sources. The authors examine the source regions for winter time dust storms (as this is the season when dust is transported towards the Amazon) for three consecutive years (2015-2017). Geomorphological characteristics of the source region were determined for the ten strongest dust storms per winter season.

The manuscript is well written and I enjoyed reading it. Nevertheless, I have a few questions I would like the authors to address before publication:

General comments:

(1) The question I am most curious to know the answer remains somewhat unan-



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Discussion paper

swered: Can you estimate how much phosphorus is supplied to the Amazon by the individual dust source regions? E.g., Schepanski et al., Atmos. Chem. Phys. (2009) examined by means of a model simulation the contribution of dust emitted from the Bodélé Depression to the atmospheric dust burden over the Gulf of Guinea and tropical Atlantic showing a contribution of up to 60% over the Equator region. But it remains unclear, how much dust passes through the tropical rain belt. I think it may be worth considering adding a trajectory analysis here showing how many dusty trajectories originating from an emitting dust source actually reach the Amazon without being affected by rainfall or clouds.

(2) Related to question (1), how many of the identified dust sources actually contribute to the dust deposition flux over the Amazon? This can be addressed by a trajectory study as well and would be a worthy contribution to the scientific discussion on the fertilization impact of northern African dust sources.

(3) Was the dust mass per source region calculated for all identified dust storms originating from the corresponding location or for a selected number only? This refers to line 18-20, page 7. Please clarify. Same for the numbers provided in the results section: Are these based on all identified dust storms? Which quantities are put in relation?

(4) Can you please explain in more detail how the dust mass fractions were calculated (refers to line 9-12, page 9)? Providing the fraction implies you know the annual total - or at least did some assumption. Which mass fractions are related? Please clarify.

Minor comments:

p 5, l 15-16 It is absolutely reasonable to limit the calculation to the ten strongest dust storms. Can you add a brief statement on the representativeness of the results despite this selection is made?

p 7, l 9-14 Please consider referring to a map illustrating the location of the listed source

regions.

p 13, l 6 There are studies highlighting the Sudan as active dust source. E.g. Schepanski et al., (Geophy. Res. Lett. 2007, J. Geophys. Res. 2009), and Formenti et al., (Atmos. Chem. Phys., 2011).

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