

Detailed replies to both anonymous referees comments on

Krätschmer, S., van der Does, M., Lamy, F., Lohmann, G., Völker, C., and Werner, M.: *Simulating glacial dust changes in the Southern Hemisphere using ECHAM6.3-HAM2.3*, *Clim. Past Discuss.* [preprint], <https://doi.org/10.5194/cp-2021-73>, in review, 2021.

2nd Revision: Technical Corrections

Referee 1:

Comment by referee 1	Reply by authors	Changes in the manuscript
Concerning my comment on (old) lines 213-214, just to clarify, I was not encouraging the authors to compare their results with (Stanelle et al., 2014), but rather to show the comparison of their model setup in current climate conditions with (Huneus et al., 2011), or to provide a reference that does that with the same model version and setup used here.	<p>Thank you for the clarification. Please find below the comparison of our simulation results for present-day dust deposition at various sites to observed data provided by Huneus et al. (2011). Generally, our model results match well with the observational data. In particular in the West Pacific we find an improvement compared to the previous model version used by Stanelle et al. (2014).</p>	We included the two figures in the Supplement and added an according reference in the lines 236-237.
305: It looks like it should be “Fig. 2g and h”.	Thank you for the hint, we will correct it in a revised version of our manuscript.	We have corrected the reference in line 306.
313: I am not sure that the citation to (Kohfeld et al., 2013) should be referred to as “DIRTMAP”; perhaps you could say simply e.g. “the compilation of dust deposition from Kohfeld et al. (2013)”	<p>We will rephrase the sentence as follows:</p> <p>“We use the compilation of dust deposition data from Kohfeld et al. (2013) for a comparison [...]”</p>	We have rephrased the sentence accordingly in line 314.
431-433: Perhaps the improved discussion of section 3.2.4 would benefit from the results on the influence of deposition mechanisms on dust size not only over the Southern Ocean, but also above Antarctica (e.g. Albani et al., 2012).	Thank you for the suggestion, we will include the findings of Albani et al. (2012) on the influence of wet and dry deposition on the observed spatial variation in particle size in Antarctica during the LGM.	We have included the according aspects in our discussion in the lines 475-481.

Referee's references:

Albani, S., Mahowald, N. M., Delmonte, B., Maggi, V., and Winckler, G.: Comparing modeled and observed changes in mineral dust transport and deposition to Antarctica between the Last Glacial Maximum and current climates, *38*, 1731–1755, <https://doi.org/10.1007/s00382-011-1139-5>, 2012.

Huneus, N., Schulz, M., Balkanski, Y., Griesfeller, J., Prospero, J., Kinne, S., Bauer, S., Boucher, O., Chin, M., Dentener, F., Diehl, T., Easter, R., Fillmore, D., Ghan, S., Ginoux, P., Grini, A., Horowitz, L., Koch, D., Krol, M. C., Landing, W., Liu, X., Mahowald, N., Miller, R., Morcrette, J.-J., Myhre, G., Penner, J., Perlwitz, J., Stier, P., Takemura, T., and Zender, C. S.: Global dust model intercomparison in AeroCom phase I, *11*, 7781–7816, <https://doi.org/10.5194/acp-11-7781-2011>, 2011.

Kohfeld, K. E., Graham, R. M., de Boer, A. M., Sime, L. C., Wolff, E. W., Le Quéré, C., and Bopp, L.: Southern Hemisphere westerly wind changes during the Last Glacial Maximum: paleo-data synthesis, *68*, 76–95, <https://doi.org/10.1016/j.quascirev.2013.01.017>, 2013.

Stanelle, T., Bey, I., Raddatz, T., Reick, C., and Tegen, I.: Anthropogenically induced changes in twentieth century mineral dust burden and the associated impact on radiative forcing, *119*, 13,526–13,546, <https://doi.org/10.1002/2014JD022062>, 2014.

Author's references:

Albani, S., Mahowald, N. M., Delmonte, B., Maggi, V., and Winckler, G.: Comparing modeled and observed changes in mineral dust transport and deposition to Antarctica between the Last Glacial Maximum and current climates, *Clim. Dyn.*, *38*, 1731–1755, <https://doi.org/10.1007/s00382-011-1139-5>, 2012.

Huneus, N., Schulz, M., Balkanski, Y., Griesfeller, J., Prospero, J., Kinne, S., Bauer, S., Boucher, O., Chin, M., Dentener, F., Diehl, T., Easter, R., Fillmore, D., Ghan, S., Ginoux, P., Grini, A., Horowitz, L., Koch, D., Krol, M. C., Landing, W., Liu, X., Mahowald, N., Miller, R., Morcrette, J.-J., Myhre, G., Penner, J., Perlwitz, J., Stier, P., Takemura, T., and Zender, C. S.: Global dust model intercomparison in AeroCom phase I, *Atmospheric Chem. Phys.*, *11*, 7781–7816, <https://doi.org/10.5194/acp-11-7781-2011>, 2011.

Kohfeld, K. E., Graham, R. M., de Boer, A. M., Sime, L. C., Wolff, E. W., Le Quéré, C., and Bopp, L.: Southern Hemisphere westerly wind changes during the Last Glacial Maximum: paleo-data synthesis, *Quat. Sci. Rev.*, *68*, 76–95, <https://doi.org/10.1016/j.quascirev.2013.01.017>, 2013.

Stanelle, T., Bey, I., Raddatz, T., Reick, C., and Tegen, I.: Anthropogenically induced changes in twentieth century mineral dust burden and the associated impact on radiative forcing, *J. Geophys. Res. Atmospheres*, *119*, 13,526–13,546, <https://doi.org/10.1002/2014JD022062>, 2014.

Referee 2:

Referee 2 did not suggest any further revisions and recommended publication in its current form.