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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dehydration effects from contrails in a coupled contrail–climate model" *by* U. Schumann et al.

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We thank the reviewer for his/her comments and suggestions. We repeat the comments below (1) and then add our replies to this (2).

(1) This study addresses an important question concerning the redistribution of humidity in the atmosphere by contrails at global scale. By coupling a climate model with a contrail model, it quantifies the effect of dehydration on the radiative effect of contrails and of the redistribution of humidity in the atmosphere. The authors report a small negative net radiative forcing from dehydration related to a reduction of the liquid and ice water paths and cloud cover of low and high-level clouds. The manuscript is clearly structured and presented, and I recommend its publication in its present version, with

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very minor suggestions.

(2) We thank for this positive general comment.

(1) Figures 3 and 4 seem to have been swapped.

(2) Thank you. Corrected.

(1) Page 19575, line 6: The authors mention some factors that affect contrail RF, to which contrail lifetime and diurnal variation should be added, as these factors play a crucial role in the balance between the SW and LW contrail forcing contributions.

(2) We wrote: "Moreover, the RF values depend on the radiances without contrails, cloud temperatures, optical ice particle properties, cloud overlap, and 3-D effects (Meerkötter et al., 1999; Markowicz and Witek, 2011; Forster et al., 2012; Yi et al., 2012).“

We change this as follows: "Besides on contrail life times and diurnal variations, the RF values depend on the radiances without contrails, cloud temperatures, optical ice particle properties, cloud overlap, ice water path, and 3-D effects (Meerkötter et al., 1999; Markowicz and Witek, 2011; Forster et al., 2012; Yi et al., 2012; De Leon et al., 2012).“

This includes a further reference: De Leon, R. R., Krämer, M., Lee, D. S., and Thelen, J. C.: Sensitivity of radiative properties of persistent contrails to the ice water path, Atmos. Chem. Phys., 12 7893-7901, 2012.

(1) Page 19582, paragraph 3: The authors correctly highlight the dependence of their results on the representation of sedimentation and the contrail's particle size spectrum. It would be interesting if they could also comment on the dependence of the radiative properties on these factors.

(2) When saying that the results depend on sedimentation, then we refer to the results in total, including radiative properties. We have no specific information to add on this

ACPD
15, C6938–C6940, 2015

point at this place.

However, we now mention the sensitivity to ice water path by a further reference to De Leon et al. (2012) in the changes of the sentence on Page 19575, line 6, as given above.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 19553, 2015.