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Interactive Comment

Interactive comment on "Simulated radiative forcing from contrails and contrail cirrus" *by* C.-C. Chen and A. Gettelman

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Dear Referee,

We appreciate your comments on our revised manuscript. Here is our response to your concerns.

A) We have revised the manuscript to remind the readers that all model output had been calibrated to local time for our Fig. 2 which illustrates the diurnal cycle of contrail radiative forcing.

We have checked our model output for the summer months in the Northern Hemisphere and could not find two daily minima in contrail shortwave forcing as described in several previous studies. Since our radiative transfer scheme does consider the effect of solar zenith angle, the different behavior in the diurnal contrail shortwave forcing is likely due to the contrail optical depth, as speculated by the reviwer.

The optical depth for contrail cirrus simulated by CAM5 is between 0.05 and 0.1 over the US and Europe as illustrated in our Fig. 6b and the magnitude is consistent as presented in Burkhardt and Kärcher, 2011 (Fig. 3b). The optical depth for linear contrails is expected to be even smaller which we unfortunately did not store in our instantaneous simulations. Newinger and Burkhardt, 2012 simulated contrail optical depths of similar magnitudes and found a similar diurnal cycle for contrail radiative forcing (Fig. 3b) as in our Fig. 2, i.e. no two daily minima in shortwave forcing.

The studies cited by the reviewer all used optical depths much higher. Meekötter et al., 1999 assumed an optical depth of 0.52 (Fig. 4). Dietmüller et al., 2008 (Fig. 1) artifically enhanced aviation emissions by a factor of 20 in their simulations and it inevitably increased the optical depth for contrails as well as the intensity of contrail radiative forcing. Myhre et al., 2009 and Markowicz and Witek, 2011 eassumed an optical depth of 0.3. Schumann et al., 2012 assumed an optical depth of 0.52 in their Fig. 7 and 0.3 in their Fig. 8. Forster et al., 2011 assumed an optical depth of 0.2. These studies are clearly in a different regime in terms of optical depth.

B) We have revised Table 1 to include ΔFSNT and ΔFLNT.

C) References

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Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/13/C4222/2013/acpd-13-C4222-2013-supplement.pdf

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