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Interactive comment on “Ground-based observations for the validation of contrails and cirrus detection in satellite imagery” by H. Mannstein et al.

Anonymous Referee #1

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This paper makes a valuable contribution to understanding the usefulness and limitations of satellite-based observations of contrails and cirrus. The authors visually identified contrails and cirrus in daytime, color, all-sky camera images collected about 50 km southwest of the major airport at Munich in Southern Germany over a period of 6 months. They identified coincidences of ground-based, all-sky camera data containing visually detectable contrails and cirrus with both NOAA/AVHRR and MSG/SEVERI data collects. Using the ground-based data as a baseline or “truth”, the authors determined the frequency of detection of contrails and cirrus in the NOAA/AVHRR and MSG/SEVERI data.

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The authors were able to quantify (a) the effects of contrail size and satellite footprint size on detectability, (b) the relative effectiveness of different satellite spectral bands, and the efficiency of automated contrail and cirrus detection algorithms. The authors cautioned readers concerning some of the perhaps atypical characteristics of the dataset they worked with. The all-sky camera was located near a very busy airport such that the probability of there being an aircraft within its field of view during the daytime was close to one. Therefore the absolute frequencies of contrail detection are expected to be high. Also, the thermal contrast between the Munich heat island and lakes in the area may have made detection in satellite instrument thermal bands more difficult.

This is a well thought out paper and should be accepted for publication. However, I also recommend that the paper be given to a technical editor for correcting numerous small language difficulties. Several specific comments follow.

In the Abstract (lines 17-18 of page 3184), I had particular difficulty interpreting the statement, “However, the CDA detects approx. 28% of the visually detected contrails.” Were the visually detected contrails detected in the all-sky camera data or in the AVHRR data? Judging from the statement in the conclusions section, I assume that something like the following would be less prone to misunderstanding, “However, the CDA detects approx. 28% of the contrails relative to visual detection in AVHRR data.”

In their discussion of the mechanism of contrail formation (page 3185) I missed a mention of the role of exhaust particles.

I was a little surprised that in their discussion of the climate impact of contrails (also on page 3185) the authors did not refer to the paper by Travis, Carleton, and Lauritsen, “Regional Variations in U.S. Diurnal Temperature Range for the 11–14 September 2001 Aircraft Groundings: Evidence of Jet Contrail Influence on Climate”, *J. Clim.*, 17, pgs 1123 to 1134, where these authors look at the effect of the grounding of the US

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commercial aircraft fleet in the wake of 9/11 incident. Perhaps the authors dispute the attribution of the change in diurnal temperature range to the grounding of the aircraft.

In following the discussion of Figure 1 (page 3192) I found it difficult to confirm statements about the pictures, with the possible exception of the all-sky camera images (panels e and f). On the other hand, this does help make the case for the utility of the all-sky camera imagery.

Interactive comment on *Atmos. Meas. Tech. Discuss.*, 2, 3183, 2009.

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