**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "An automatic contrail tracking algorithm" *by* M. Vazquez-Navarro et al.

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We would like to thank Referee 2 for the review of the paper. The structure of the paper was modified as suggested and the mistakes have been corrected.

Comments on the use of the wind field: Of course the a priory knowledge of the wind field would support the tracking of contrails if the ratio between spatial and temporal resolution - would be smaller. As the Meteosat Rapid Scan Service became quasi-operational in May 2008, we were able to switch to this higher temporal resolution and found, that the additional wind information from weather analyses/prediction models did no longer change the quality of of the tracking. In order to reduce the logistical complexity of the algorithm we skipped the a priory wind information from model data. As proposed, we added this information in chapter 1, but we did not remove the considerations, that lead to the definition of the 'wind field defined region', as this is essential

for the understanding of the algorithm.

On the influence of parallel contrails on the tracking: as the pictures in A1 are too small to assess it, we refer to Figs 14 and 15, which show the smooth displacement of the tracked contrail. In Fig. 15 there is neither a gap that would suggest the tracking has "jumped" to a parallel contrail in the sense of the displacement (easwtards), nor a thicker stripe that would suggest that the traking has "jumped" to a parallel contrail westwards.

* Reactions on the 'Specific comments'

p. 1440, l. 26, p. 1441, l. 1: "The paragraph abruptly ends here, but this is an excellent place to introduce the reader to the focus of the paper, the new ACTA method. The sudden transition to CDA is jarring to the reader."

We followed this proposal and used this to introduce the main goals of acta

p. 1441, l. 11-12: "a minimum length threshold (47 MODIS pixels). This appears to be different from the threshold used in Mannstein et al.? Why is this threshold different? "

For the usage of the CDA results as starting points within ACTA, the CDA was tuned for a low false alarm rate. This is now mentioned.

p. 1441, l. 15: "The physical thresholds are scene-dependent... Are these the same thresholds used in Mannstein et al.? They do not appear to be the same, because the Mannstein et al. thresholds were not scene-dependent (the binary checks related to the sum of the normalised images, the brightness temperature difference and the gradient of the 12 micron brightness temperature were constant in Mannstein et al.). "

Thank you, you are right. This is corrected now.

p. 1441, l. 22-23: "it is essential that those data cover heavily flown regions Why is it ESSENTIAL? Why could contrails in light traffic regions not be tracked? end of Section 1: To support the author case for the development of ACTA, previous estimates of

the ratio of contrail-cirrus coverage compared to linear contrail coverage would show that much of the aviation-produced cloud coverage is missed by current contrail tracking/detection methods. "

Our intention was to highlight, that ACTA works in situations with many contrails. The case with a single, isolated contrail is the easy exercise. We modified this section accordingly.

p. 1445, l. 9-21: "This paragraph is basically a more detailed rewording of p. 1444, l. 1-7, and is confusing as the thresholds and acceptance criteria are still not explained to the reader. Please omit this section, and instead, inform the reader that a detailed description of the entire step follows."

We dropped it, as proposed.

p. 1446 and Figure 7: "It is not clear from the description presented here how the north/south range of array L is determined."

Due to the fact that the contrail is a line, the westernmost and easternmost points of the contrail are also the southernmost and northernmost points if the contrail is tilted to the east (/), or northernmost and southernmost if the contrail is tilted to the west (. This is how north/south limits are established.

p. 1448, l. 24: "It may be helpful to the readers comprehension to have this information regarding the nature of the five tests mentioned earlier in the manuscript, perhaps at the top of p. 1444."

Thank you, this information has been added where you suggest.

Section 2.1: "For some of the tests, the width of the search area seems to be so narrow that if the size of the search array L is long enough, the guide points will always satisfy the acceptance (orientation) criterion, as long as enough guide points can be found. Is this true? For example, does Figure 6 pass the acceptance criteria tests even though it contains alien pixels? In other words, is the acceptance criteria test even necessary

when the contrail is long enough? How often does this situation happen?"

It could certainly be that the acceptance criteria are not necessary in the case of long isolated contrails. As the reviewer points out, a couple of alien pixels would not affect the identification of a contrail, especially if it is very long. Nevertheless, very frequently contrails are found in groups, in the presence of other contrails and in the presence of other clouds. Therefore, the acceptance criteria are needed to separate, for instance, between the guide points of the contrail ACTA is tracking and the guide points of a parallel one.

p. 1460, l. 6-7: "...each iteration requiring in average less than one minute... Is each iteration for one contrail track, or for the entire SEVIRI scene? "

For one contrail track. This information has been included in the text.

p. 1460, l. 21-23: "It would be more accurate to say that ACTA can track the evolution of the brighter and more linear parts of the contrail."

It is still not fully clear, which factors influence the detection. What is tracked is related to the contrast to the surrounding.

* Technical corrections

Figure 2:" It is not clear from this figure that ACTA can be applied forward and backward in time. Perhaps in the blue box the authors can put "Look for Contrail $C_i(t) \pm \Delta t$"? "

The caption of the figure has been modified to explain this.

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