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Atmospheric Measurement Techniques Discussions

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

Anonymous Referee #1

Received and published: 31 May 2010

Review of the paper by M. Vazquez-Navarro et al. An automatic contrail tracking algorithm

General comments

The authors describe an algorithm for detecting cirrus contrails from MSG/SEVIRI high resolution satellite images. The original contrail detection algorithm developed by Mannstein et al. (1999) for detecting linear contails has been developed further in order to track in time contrail-cirrus clouds. The study is within the aims and scope of the journal, scientific results are presented in a clear way, the English language is proper, and I recommend publication after minor revisions.

Specific comments

1. I think that the authors miss to emphasise the usefulness from the application of their

product. This could be done in the Conclusions which have been structured more like a Summary of the paper. It is important to point out that the detection of cirrus contrails over air traffic areas from high resolution satellite data will provide better knowledge of the coverage and radiative forcing of manmade cirrus clouds, whose present knowledge is still poor. Results would be useful to studies examining cirrus cloud cover and their trends over regions with high air traffic and their radiative impact. It should be also noted that the tracking of manmade clouds by ACTA would be useful to construct a time series of cirrus contrails over Europe and the North Atlantic flight corridors. The construction of such a time series from high resolution satellite data would be useful to studies examining changes in cirrus cloudiness in relation to air traffic over Europe and the North Atlantic such as the studies by Zerefos et al. (2003), Stuberauch and Schumann (2005), Eleftheratos et al. (2007). The authors should also mention that the application of their algorithm over regions like Southeast Asia in which contrails, contrail-cirrus and their trends have been less investigated compared to the North Atlantic and North American flight corridors could support studies focusing over the SE Asia corridors, i.e., Meyer et al. (2002) and Zerefos et al. (2007).

2. What is the temporal resolution (Δt)? Is it 5 min (as you say on pages 1446,1459), is it 15 min (SEVIRI sampling frequency) or is it 25 min (page 1474 figure caption)?

3. page 1461, the lines 20-end describe the figure of the example. Maybe the description of the example should not be part of the conclusions.

Technical comments

page 1440, line 20: I think it should be 'In satellite images, young contrails can be easily identified from their linear shape.'

page 1441, line 1: I think it should be 'It is necessary to follow a contrail from its linear stage to identify its development to contrail cirrus.'

page 1441, lines 8,9: What is the size in km of one pixel? Is it 3x3 km? Please clarify

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here.

page 1441, lines 11,12: You say 'a minimum length threshold (47 Modis pixels), a minimum number of pixels threshold (19 pixels). . .'. You give a number of 47 pixels as minimum length threshold, and a number of 19 pixels as minimum number of pixels. Both of them are numbers, and it is not clear what is the difference between the length and number thresholds. Please check if the statement is correct.

page 1444, line 10: Please rephrase the sentence.

page 1444, lines 14-15: Does this mean that in the algorithm the maximum area that one single contrail-cirrus can cover is an area of 50-200 km2 ? Or that the size of 3 pixels correspond to 50-200 km2 ?

page 1445, line 7: I think that the sentence should end at 'Figure 4 shows a short flowchart of a test in Step I.'. You don't have to mention here the Fig. 6 since you describe it later on pages 1451-52. It might confuse.

In general, I think that the sequence and the names of Figs. 6, 7, 8 are a bit confusing.

I think that on pages 1446-47 your Fig.7 should be renamed to Fig.6.

I think that on page 1448 your Fig.8 should be renamed to Fig.7

I think that on pages 1451-52 your Fig.6 should be renamed to Fig.8

After that, on

page 1473, caption: please change Fig. 7 to Fig. 6

page 1474, caption: please change Fig. 8 to Fig. 7

page 1472, caption: please change Fig. 6 to Fig. 8

page 1448, lines 6,14 and elsewhere: By definition R-square (R2) is called coefficient of determination and not correlation coefficient. The correlation coefficient, R, ranges between 0 and 1, as you properly give it on page 1441. You might think of using the

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correlation coefficient, R, throughout the whole text.

page 1449, line 3: I think it should be 'These tests...'

page 1458, line 14: I think it should be 'Many are parallel contrails that are simultaneously ...'

page 1458, line 16: I think it should be 'These situations ...'

page 1458, line 27: Please rename 'Figure 4' to 'Figure 14'

page 1459, line 11: Please rename '(see Fig. 14)' to '(see Fig. 15)'

page 1459, line 12: Please rename '(see Fig. 15)' to '(see Fig. 16)'

After that, on

page 1480, caption: please rename Fig. 14 to Fig. 15

page 1481, caption: please rename Fig. 15 to Fig. 16

pages 1482-94, captions: please rename Fig. A1 to Fig. 14

page 1460, line 7: Please correct 'requiring' to 'requires'

page 1461, line 1: Please correct 'visally' to 'visually'

page 1462, lines 9-10: This sentence doesn't sound nice.

page 1466, Table 3: The correlation coefficient is not expressed in percent. It ranges between 0 and 1.

page 1477, Fig.11 caption: in order to be consistent with the text, please change 1 to a, 2 to b, 3 to c, 4 to d, 5 to e, 6 to f.

page 1462 (References):

The following references are not cited in the text. Please either cite them or remove them if they are not needed:

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Lee et al. 2009

Minnis et al. 2004

Sassen et al. 1997

Schroeder et al. 2000

Schumann et al. 2005

I suggest to add the following four references (see Specific comment 1):

Eleftheratos, K., Zerefos, C. S., Zanis, P., Balis, D. S., Tselioudis, G., Gierens, K., and Sausen, R.: A study on natural and manmade global interannual fluctuations of cirrus cloud cover for the period 1984–2004, Atmospheric Chemistry and Physics, 7, 2631–2642, 2007.

Stubenrauch, C. J., and Schumann, U.: Impact of air traffic on cirrus coverage, Geophys. Res. Lett., 32, L14813, doi: 10.1029/2005GL022707, 2005.

Zerefos, C. S., Eleftheratos, K., Balis, D. S., Zanis, P., Tselioudis, G., and Meleti, C.: Evidence of impact of aviation on cirrus cloud formation, Atmospheric Chemistry and Physics, 3, 1633–1644, 2003.

Zerefos, C. S., Eleftheratos, K., Zanis, P., Balis, D. S. and Tselioudis, G.: Search for man–made cirrus contrails over Southeast Asia, Terrestrial Atmospheric and Oceanic Sciences, Vol. 18, No. 3, 459–474, doi: 10.3319/TAO.2007.18.3.459(EA), 2007.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 1439, 2010.