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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Detection of ship tracks in ATSR2 satellite imagery" *by* E. Campmany et al.

E. Campmany et al.

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1. It would be very useful if the authors briefly discuss statistics on the ridgelet detection and connectivity attempts. For example, how many ridgelets were detected, and of which, how many were classified as tracks (and eventually called ship tracks) after satisfying connectivity rules in a given scene? Also information on how many tracks were strictly linearly oriented (or curvilinear) might be of interest here.

The reviewer makes a good point, however in order to speed computation and due to the great amount of data analysed, such information is not available. The code only recorded the tracks that satisfied the connectivity rules for a determined number of loops and dumped the ridgelets that did not satisfy the criteria.

2. Section 2.2: How sensitive your results are to the chosen pixel spacing (to check the intensity) along the ridge? It would be nice here to give little background information on the width of the ship tracks (although it depends on many factors)

The pixel spacing, along with other parameters, was varied to tune it on confirmed ship track scenes. Some information about this has been added to the text (new subsection 2.4). According to the MAST experiment the typical width of a ship track is 9 $\pm$ 5 km as indicated in section 1.2.

3. Would it be helpful to categorize the detected ship tracks into groups by giving them some kind of weighting based on how closely connectivity rules were adhered to?

Since the algorithm counted loops through the connectivity rules, it gives a higher weighting for a continuing straight line segment than one with the same number of pixels which changes in direction. This is because when tracing along a straight line the jump between ridgelet centres for each loop is only one pixel, hence increasing the number of pixels in the track by 1 for each loop rather than 2 or 3.

4. Have you used albedo in 3.7 micrometer channel in your detection procedure? Would it give better intensity contrast to separate these bright linear features (smaller droplets, higher albedo in 3.7 micrometers)?

The reviewer is right, the 3.7 micrometer channel has a better intensity contrast. Unfortunately the ATSR2 has such channel switch off above ocean. The AATSR however does have operative the 3.7 micrometer channel on all the time and will be used in future studies.

5. Section 3.1, last three lines: Would you elaborate on exactly how do you use your validation to normalise the estimated number of tracks?

The normalization has not been applied to the results of the present paper as indicated in section 3.2. Last sentence of section 3.1 has been removed to avoid confusions.

6. It is bit surprising to see that in spite of high false detection, no ship tracks were detected in the southern hemisphere (esp. southwest coast of Africa). Any comments why?

We do not have a scientific explanation for the ship tracks not detected by the algorithm

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7. page 14824, line 21: do you mean "distortion" instead of "distorsion"?.

"Distortion", text amended

8. Since the algorithm is fully automatic, I would suggest to give title of the paper as "Automatic detection of ....".

Done

9. The words "the pixels" are repeatedly used in the paper. However it is not very clear from which channel they are.

All the pixels analysed in this study are from the 1.6 microns channel

10. A bit different question: Do ship tracks only form in the developing or existing clouds? Can emissions reach high enough to form new linear cloud features? If so, such cases will have strongest contrast to the background and thus easy to detect (but probably more wider). Any comments on this?

It is hypothesized that certain background environmental conditions need to be in place before the formation of ship tracks can occur (Durkee et al., 2000b). These conditions include a small boundary layer depth, pre-existing cloud formation mechanisms, and CCN concentration below a threshold value. The Monterey Area Ship Track (MAST) study returned average values of wind speed of 7.8 ms^{-1} , surface pressure of 1018.3 mb and surface temperature of 287.8 K (Durkee et al., 2000a)

References

Durkee, P. A., Chartier, R., Brown, A., Trehubenko, E., Rogerson, S., Skupniewicz, C., Nielsen, K., Platnick, S., and King, M.: Composite Ship Track Characteristics, J. Atmos. Sci., 57, 2542-2553, 2000a.

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Interactive Comment