Geoscientific
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Discussions

Interactive comment on "Detection, tracking and event localization of interesting features in 4-D atmospheric data" *by* S. Limbach et al.

Anonymous Referee #2

Received and published: 19 January 2012

This is an interesting paper which describes a new algorithm based on the region growing technique used in image processing to identify and track 3D features in spatial-temporal atmospheric data. The algorithm is described completely and is used to identify upper tropospheric jet streams and study their climatology. I think the algorithm could be potentially very useful for atmospheric research and therefore should be published, but I have a number of comments that need to be addressed before publication to make the purpose and objectives of the algorithm clearer and to make the paper more accessible to a wider readership.

Major Comments:

(1) I think the introduction to the paper should include more discussion of the motivation for the algorithm. The authors list 3 points as to how the algorithm differs from existing

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region-growing based feature detection, but there is little discussion about why this is beneficial. What advantages does the algorithm have over those already existing? Why is a new 4D algorithm necessary? What science questions can this new algorithm be used to answer (that other algorithms are unable to answer)?

(2) The algorithm is described very formally using mathematical set notation. Whilst this is all correct, I wonder if it sometimes makes the description more complicated than is necessary. Some of the ideas described are quite simple concepts to describe in words and I think the formal mathematical definitions may make the paper less accessible to some readers. This is partly personal preference and some readers may appreciate the mathematical description. However, if the authors decide to keep this, I think they should also give a description of the algorithm in words, probably before the algorithm is described formally. The authors have partly done this anyway since there are descriptive passages between the formal definitions, but I think it would be beneficial to have a description of the entire algorithm before it is described mathematically. I think this will make the paper and algorithm more accessible to some readers and will also make the mathematical description easier to follow.

(3) This paper is structured with the description of the algorithm followed by an example of its application to explore the climatology of upper-tropospheric jet streams. I think the description of the algorithm should also include examples to illustrate. The authors sometimes do provide examples, such as in the input data section where jet streams and wind data are used to illustrate. It would be useful to have such examples throughout the description of the method. This would be particularly useful to illustrate the local selection, global selection and homogeneity criteria. The example of jets given at the end of the paper does not require any homogeneity or global selection criteria, so it would be useful to include some examples of these in the description of the algorithm. Since the purpose of the new algorithm is to use it to analyse atmospheric data sets, I think it is important to make sure the practical applications of the algorithm are clear.

(4) The authors should thoroughly check through the manuscript for grammatical errors

as this could be improved considerably.

Minor Comments:

(1) Page 3015, line 3: Please rephrase the sentence beginning "These algorithms allow, for instance, to produce so-called..." as it is grammatically incorrect.

(2) Page 3016, line 2: Please change "was" to "were".

(3) Page 3016, line 5: Please insert "current" before study for clarification.

(4) Page 3016, line 16-17: Please explain somewhere how the algorithm is more efficient to previous algorithms.

(5) Page 3016, line 19-21: Please clarify this point, it is not clear to me what is meant.

(6) Page 3032, line 2-3: "multiple major, separate jet stream phenomena" please rephrase, I'm unclear what this means.

(7) Figure 2: Please state in the caption what the different colours in the 3D features are.

Interactive comment on Geosci. Model Dev. Discuss., 4, 3013, 2011.

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