

## ***Interactive comment on “Insights on the three-dimensional Lagrangian geometry of the Antarctic Polar Vortex” by Jezabel Curbelo et al.***

**Jezabel Curbelo et al.**

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Received and published: 8 June 2017

### **Answer to Referee 2**

We wish to thank to this referee for his/her very useful comments, which have helped us to improve the manuscript, and have been addressed as follows:

#### **Issues:**

1. *The claim is that structures are identified in a 3D flow. But I would expect to see some extracted 2D structures, as was done in the cited paper du Toit, P. C. and Marsden, J. E. (2010). However, this is not the case. We merely see cross-sections of what are presumably 2D structures in the 3D flow.*

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The Introduction of the new version of the manuscript explains (from lines 8 to 28) different approaches used to identify 3D Lagrangian structures in 3D flows. The one by du Toit and Marsden is one but not the only one. In the new Section 2 these issues raised by the referee are carefully addressed. Our approach consist of the use of function  $M$  and this methodology gains insights in the 3D flow by computing the function  $M$  on slices with different orientation. This approach does not compute surfaces representing the 2D invariant manifolds, but obtains them by means of slices and has the advantage of highlighting tori-like invariant structures.

**2.** *How to identify elliptical LCS from the  $M$  function should be stated more clearly.*

We have done this in Section 2.

**3.** *The use of the term algorithm in this paper is a bit confusing. Usually one expects to see a set of step by step instructions or a flow chart associated with an algorithm.*

We have done this in Section 3.2.

Please also note the supplement to this comment:

<http://www.nonlin-processes-geophys-discuss.net/npg-2017-8/npg-2017-8-AC2-supplement.pdf>

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Interactive comment on Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2017-8>, 2017.

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