Interactive comment on "A network-based detection scheme of the jet stream core" by Sonja Molnos et al.

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General Comments:

This paper addresses scientific questions relevant to ESD because it introduces a new methodology for identification of jet streams and then applies it reanalysis data to provide a useful probability analysis of PFJ/STJ core positions. Although numerous methods to characterise the properties of jet streams exist this represents a useful contribution to the literature by introducing a novel method. One aspect of the jet literature is that although general definitions do exist there are a number of different operational definitions essentially determined by the methods used to characterise the jets, in this case local maximum wind speeds in a mass weighted layer. I thought the context of the method was a little underdone (particularly in the abstract) and the paper would

benefit from a little more discussion on other similar work even if only to highlight the advantages of this approach. Overall the method is well developed and reasonably well described but there are a few areas where the language is confusing (see comments and corrections below). I think a minimalist change to the title would probably be "A network-based detection scheme for the jet stream core". While I would suggest a couple of changes (see below) the abstract reflects the content of the paper. The overall structure of the paper is quite good although there are a couple of minor problems, e.g. Equation 6 is discussed on page 6 before it is actually given on page 7, which could be addressed. I would recommend publication with some changes.

Specific Comments:

1. I'm not so sure that algorithms to detect jet cores are lacking (as stated in the abstract). There are actually a relatively large number of previously published papers which are based on either a single level/layer or zonal/sectorial mean latitude-pressure fields. The current application of the network-based method is yet another variation of this and so needs to be put in context with other (similar) methods which use single level or mean-layer wind fields (e.g. Koch et al, 2006, Archer & Caldiera 2008, Pena-Ortiz et al 2013). Hence at the risk of expanding the paper too much I think it would be useful to acknowledge some more of the previous work and to compare with the results obtained here (even though they are based on a 15 day mean as opposed to monthly means) and discuss why this method has advantages over the previous studies.

2. I think 'time step' is a confusing choice of phrase to describe the 15 day means – maybe use 'time period' ?

3. The simulated annealing actually uses the Rikus algorithm so it is being used as more than just a comparison. (page 1, line 18) and the abstract description should reflect that.

4. Were the original runs (Fig. 2) done with with the un-optimised weights from table 1? If not what was used?

5. The supplementary plot (S1) is only mentioned in a single sentence without sufficient context to make it worth while. Either add more discussion or remove it?

Technical Corrections:

Abstract Line 21: 'mean longitudes of 20S and 140N' ?????? I don't know what this is supposed to mean!

Page 2, line 27: No year given for Gallego et al (and in reference list). Try 2005.

Page 2, line 32: there is no reference for Limbach et al (2012).

Page 3, line 2: "zonally" should be "zonal"

Page 3, line 4: "such approach" should be "such an approach"

Page 3, line 13: "all different" should be "different"

Page 3, line 18: "for 4" should be "four"

Page 4, lines1,2: I'm not sure what this line actually means!

Page 4, lines 3,4: "To avoid noise and reduce computational costs only those grid points where the wind velocity is greater than 10% of the maximum wind velocity for the considered time step are connected."

Page 4, lines 12-13: The description of the weights is inconsistent – is their sum 1 or less than 1?

Page 5, equation 4: there appear to be some brackets missing in the denominator.

Page 5, line 19: "near of 65" should be "near to 65"

Page 6, line 15: "First a maximum (minimum) filter" should be "First a local maximum (minimum) filter"

Page 7, line 5: "With the found zonal mean subtropical and polar jet stream latitudes by Rikus" should be "With the zonal mean subtropical and polar jet stream latitudes found

by Rikus' algorithm"

Page 7,lines 7-8: This sentence needs to be clarified.

Page 7, line21: "it is more undulated" should be "it undulates more"

Page 7, lines 22-23: Try - "Improvements in the jet stream core positions due to the optimization process relative to the positions found by the untuned ..."

Page 8, line 7: "polar Jet" should be "polar jet"

Page 8, line 16: "not between minimum and maximum latitude" should be "not between the minimum and maximum latitude"

Page 8, line 17: "equivalent of 6.4" should be "equivalent to 6.4"

Page 8, line 20: Change to "These differences are due to the undulations explained above." ?

Page 9, lines 16-34: The language needs to be cleaned up – the section does not scan well with a number of missing 'the' and 'a's.

Fig. 4 caption (page 15, line 14): the points in (f) are blue not white.

Fig. 5 caption (page 16, line 4): should be "compare with Fig. 2"

Fig. 6 caption (page 16, line 7): Remove ", compare Fig. 2." - it is not necessary.

References:

Gallego D, Ribera P, Garcia-Herrera R, et al. (2005) A new look for the Southern Hemisphere jet stream. Clim Dyn 24:607–621. doi: 10.1007/s00382-005-0006-7

Koch P, Wernli H, Davies HC (2006) An event-based jet-stream climatology and typology. Int J Climatol 26:283–301. doi: 10.1002/joc.1255

Limbach S, Schömer E, Wernli H (2012) Detection, tracking and event localization of jet stream features in 4-D atmospheric data. Geosci Model Dev 5:457–470. doi:

10.5194/gmd-5-457-2012

Pena-Ortiz C, Gallego D, Ribera P, et al. (2013) Observed trends in the global jet stream characteristics during the second half of the 20th century. J Geophys Res Atmos 118:2702–2713. doi: 10.1002/jgrd.50305

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