

# ***Interactive comment on “Smoke-charged vortices in the stratosphere generated by wildfires and their behaviour in both hemispheres: comparing Australia 2020 to Canada 2017” by Hugo Lestrelin et al.***

## **Anonymous Referee #2**

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*Review on the paper*

**Smoke-charged vortices in the stratosphere generated by wildfires and their behaviour in both hemispheres : comparing Australia 2020 to Canada 2017**

*by Lestrelin, H., Legras, B. Podglajen, A. and Salihoglu, M.*

The authors re-analysed the evolution of smoke clouds resulting from the wildfires that occurred in Canada in 2017 and Australia in 2019-20. In particular, the authors focus on the PV field (or rather a modified PV field, II, referred to as the Lait PV field) together

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ozone concentration to track the smoke clouds confined in anticyclonic eddies. The use of the PV field provides a natural and pertinent analysis, and is clearly justified in the paper. Overall the paper is well written, interesting and shed new light on the evolution of the events.

### Scientific points

1. Line 90 Müller & Günther uses  $\Pi_g$  for  $\epsilon = -4$  and  $\Pi_L$  for  $\epsilon = 9/2$ . Maybe the authors could use the same convention, and add a comment to explain why they use different values of  $\epsilon$ .
2. Line 114, the authors state ‘mean at the same latitude and altitude’. Do they mean a zonal average or a time average?
3. Can the volume integrated PV be determined for each vortex from the available data? If yes, can anything meaningful be discussed, in particular during the vortex evolution and the splitting events? Alternatively, does the nature of the way PV is obtained make such an analysis irrelevant?

### Minor wording points

1. Line 30, sentence “It is a natural..”. Possibly rephrase to read ‘Investigating... is a natural extension to [ADD REF(S)]’.
2. Line 37, maybe insert ‘Australian’ between ‘2020’ and ‘case’
3. Line 116, if the steps  $n - 1$ ,  $n$  and  $n + 1$  refer to times, it may be worth mentioning is explicitly.
4. Line 133, ‘to dissociate/dissociating’: the verb/term ‘to split/splitting’ is the most often used when discussing vortex breaking.

5. Line 147, Please check the use of the word 'thalweg'.
6. Lin 153, insert 'a' between 'month' and 'half'
7. Line 175, fix the reference to the figure
8. Line 201 'formation' may be better than 'birth'; 'decay' or 'destruction' may be better than 'loss' (also line 118)
9. Line 279, NH is not explicitly defined. Although line 331 suggests the authors refersto Northern Hemisphere.
10. Line 313, SW is not explicitly defined.
11. Overall revise the punctuation. Some sentences are long and could be split into several shorter sentences. Additional commas could also help readability.

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