Review of the revised manuscript by Rutherford et al.

The authors have done a great effort to substantially improve their manuscript. Their results are now better explained with a much more precise wording.

I still request some important corrections before publication.

Major comments:

1. I appreciate the effort of the authors to display the separation of air masses R_1 and R_2 in Fig.2a and the manifold related to Lee. However I still find the presentation of the results rather confusing. In particular, I have a lot of difficulties in understanding the precise (not qualitative) definitions of the pouch, of the different regions R1, R2, relation with the lobe L1 or the air coming from Nate).

   (a) It would be useful to have a figure at an earlier time (for instance 12 UTC Sept. 5 since it is mentioned in the text line 19, page 10) to see the appearance of L1.

   (b) How are defined R_1 and R_2 at 12UTC 7Sept? Is it just L_1 and the pouch, respectively? Do you track the manifold related with Lee? The separation curve should be displayed on Fig. 2d or 2e. This is quite important in your discussion page 10.

2. Line 15, page 10, it is claimed that the pouch region originating from Lee contains high PV air while line 23 page 11, it is claimed that L1 contains low PV air.

   But

   (a) I am completely unable to deduce these two statements from Fig. 3b. Instead of having a continuous gray shading, can you map only a limited number of gray nuances? Also can you show only positive PV values?

   (b) Also isn't it contradictory that L1 and R1 have air masses with different properties if both represent the lobe region? I guess this is the main problem of the manuscript as it is not precise enough to distinguish R1 and the pouch region, so that in many places the reader is confused between the two regions.

3. Concerning the non-divergent lobe transport, line 31, page 15, you cannot claim that "divergence has little impact on manifold structure" since, precisely, the non-divergent alone cannot explain the size of the lobe!

   Actually, it is quite interesting to see that the lobes almost completely disappear (contrary to what you state) and are parallel to contours of the water vapor mixing ratio. This should be discussed as it means that the velocity divergence is responsible of the convergence of the material lines towards the center of the cyclone and of the inward transport of dry air. On the contrary, non-divergent motions seem related to a transport barrier so that no air from outside can enter inside the vortex.

4. Last statement page 16 is incorrect: I am unable to see a quick drop in relative humidity outside the shear sheath. Values are still quite high (r> 85%) at radius r= 2.5.

5. Your Okubo-Weiss definition does not take into account the divergent part of the flow. It has to be taken into account in addition to the shearing effects since it brings material inwards, even if there is a "shear sheath". This is quite important to discuss, as even hyperbolicity is ill-defined in this context.

Minor comments:

1. Top of page 10. In ECMWF, L1 has a negative circulation. On the contrary, when looking at Fig. 4a, L1 in WRF simulation is positive. Please comment.

2. The color palette is also awful for (relative?) vorticity in Fig.4. Can you use something that would be more practical? Same thing for Fig.3. All panels are kind of "blurred". Also in Fig.4, the color of the manifolds is reversed compared to Fig.2.

3. Page 16, line 17. It is incorrect to say that "the strain regions are advected inwards". There is no advection in here!

4. You still do not explain in the text how results of figure 7 are obtained (radial average around the center defined by ...).

5. Figure 7. You should say that the radius is in degree.