Major Comments

#1. There are some concepts that are used but not defined in the article (detailed in specific comments below)

#2. I don't understand the declaration made in Section 2.2, lines 161-164 about the particles P1 and P2 in Figure 3. It is not clear what the authors refer by ''particle movements", but I suppose that it should be particle trajectories of passive tracers that follow the streamlines of the geostrophic velocities derived from the SLA. In such case, the streamlines just follow the SLA contours, so that P1 and P2 follow the same trajectory (almost the same, because they are not exactly in the same SLA level) rotating around the 2 cyclones. Geostrophic velocity definition (g gravity, f coriolis parameter, H SLA) Vx = -g/f dH/dy Vy = g/f dH/dx Instead, it seems that you are considering that SLA is a potential of the velocity, V =grad(H), like they were falling by gravity...

Reply: Yes, they were falling by gravity, which is the origin of watershed idea.

#3. There is missing the definition of the watershed (also pointed below).

Reply: We add the notation in section 2.4. (For basins, the "watershed" is a ridge between them, while it is a valley for plateaus).

#4. As terminology, I would consider births and deaths within the dynamic processes, next to merging and splitting (and as opposite to kinematics). It's just a suggestion, and it's on you to do the changes.

Reply: We are not clear this comment. In our codes, we treat them equally. The user can have their own strategies and modify the codes, if he wants.

#5. I'm not sure that criteria 1-4 for eddy identification is what define eddies. It is clear that this defines well the maximum but regarding the ''territory" it is defined by the points inside the outmost SLA contour (as you state in line 141). So, you can have points around a maximum satisfying the conditions but being outside the defined boundary.

Reply: We are not clear what you concern. We have descript the algorithm of identification in section 2.4 (*Now, we rewrite this part based on comments by you and others*). Since we find a simply-connected region with a given threshold (see reply #9 below), it seems that no points outside the defined boundary could be taken as eddy.

#6. I think the algorithm on Similarity Vector with classification T0-T3 is very smart, but I am wondering that the variables r1 and r2 defined as fraction of overlap areas would just be valid for small time steps. I know you are using AVISO product with daily time step, but did the method work for weekly data? (note that r1 (r2) in this case would be too close to 0 (small overlaps). In this sense, I think the territory overlap may be too sensitive to the time-step, and maybe another variable (shape criteria from Mason et al. (2014) + Area, for example) could work too, being less sensitive to time-step.

Reply: We totally agree with you that ratios r1 and r2 would just be valid for small time steps. We also agree that another variable (shape criteria from Mason et al. (2014) + Area, for example) could also work too, which we have mentioned as alternative way for dimensionless similarity parameters. But we think time-step should be considered as limitation. This is something like CFL condition (for time step) in

computer fluid dynamics. And we think any tracking method should have this time-step limitation (depending on eddy size/propagation speed), if one don't want to mix one signal with another. We add this point in discussion section 5.2.

#7. Related with the previous question: in the Look-ahead, isn't the threshold rc reduced? I suppose that for N = 1 or 2 can work with no changes, but for greater N's the ratios r1 r2 will diminish because eddy movements.

Reply: We totally agree with you that ratios r1 and r2 will diminish for greater N's. A general treatment seems to be useful, but we do not know the accrue relationship. For example, one can use rc=rc_0-a*N. But others may comment how to choose a, or even suspect this relationship. So in this paper, we use only small N's in the approach.

Specific Comments

#8. Concepts that would be desirable to be defined or clarified (somewhere) in the article âA ˇ c Mononuclear / multinuclear eddy. I know what you are referring about, but ´it would be desirable to define them. âA ˇ c Eddy segmentation. â ´ A ˇ c Watershed. How is ´it defined?

Reply: we now add the definition of Mononuclear / multinuclear eddy in section 2.2. "The eddies may be identified with multinuclear (two or more SLA extremes in one eddy) or mononuclear (only one SLA extremum in one eddy)".

#10 Page 3. L93 If the algorithms work well*: : :* What do you mean with this?

Reply: We are sorry for the unclear. We mean, if the algorithms was implemented with the computer codes properly. Since the GEM model itself (Fig 8) doesn't take efficient algorithms/codes for granted, it can be implemented with different algorithms/codes by users. Thus, the accurate and efficient may be much different. We have modified to "if the GEM was implemented with the computer codes properly".

#9. Page 4. L127 The SLA value of the eddy is above (below) a given SLA threshold How is defined the SLA value of the eddy? The SLA of the extremum? Also, you should give the threshold value (for sake of coherence... you are giving the threshold values that appear in conditions 3 and 4 in the next two lines).

Reply: We choose 3 cm as threshold in our calculation. The potential cyclonic eddy should be within a simply-connected region whereas SLA>3 cm. The anticyclonic eddy SLA<-3 cm.

#10. Some (not all) grammatical issues: - look ahead/ look-ahead (sometimes with dash/sometimes without it) - straight-line / straight line model (sometimes with dash/sometimes without it) - some names are given with small letters -e.g. multiple hypothesis assignment (MHA)- and other in capital letters –e.g. Genealogical Evolution Model- . Check it for coherence

Reply: Thanks.

Page 1. L 32 Such transports has -> have

Reply: Thanks.

Page 1. L 37 Eddies can also be identified from velocity fields.

Reply: Thanks.

Page 3. L97 The data and eddy detection method -> methods (*: : :* are*: : :*)

Reply: Thanks.

Page 3. L98-99 computation complex -> complexity?

Reply: Thanks, we modified to complexity.

Page3. L99 illuminated -> shown

Reply: Thanks.

Page 4. L100 data noises -> data noise

Reply: Thanks.

Page 4. L105 SLA is an altimetry field, not a flow field

Reply: Thanks.

Page 4 L106 daily -> daily (not in cursive)

Reply: Thanks.

Page 4. L107-108 by the AVISO -> from AVISO

Reply: Thanks.

Page 4. L116-117 might affect to the eddy detection

Reply: Thanks.

Page 4. L120 from SLA data

Reply: Thanks.

Page 5. L155 with a given threshold*: : :* threshold of what? You previously defined several thresholds

Reply: The threshold of SLA >3 cm for cyclonic eddies, SLA<-3 cm for anticyclonic eddies.

Page 5. L160-164 I don't understand why do you talk about particles here, and in this way*: : :*

Reply: Since the idea of watershed requires that particles move by gravity. This naturally provides a way to segment the eddy.

Page 6 L175 (also L190 and others) previously-identified -> previously identified

Reply: Thanks.

Page 7 L203 days -> day

Reply: Thanks.