(Abstract)

Line 11. "The Genealogical . . (GEM) presented here is an efficient . ."

Reply: thank you.

Lines 16-17. ". . Second, for tracking when an eddy splits, GEM uses both "parent" (the original eddy) and "child" (eddy split from parent) and the dynamic processes . ."

Reply: thank you.

Line 18. "Additionally, a new look-ahead approach . ."

Reply: thank you.

Line 21. I do not like "time complexity" either! I think you just mean "number of computing operations" which can be more simply stated as "computer time" or "runtime" as on line 103 [the unit of time would be the time for one computer operation]. See also lines 68, 96(twice), 103, 273, 320, 322, 324, 325, 327, 329, 549 (and perhaps other places).

Reply: we modified to "computer time".

(Introduction)

Line 70. ". . motion of an eddy. . ."

Reply: thank you.

Line 82. ". . risk of missing an eddy . ."

Reply: thank you.

Line 84. ". . may arise from two or more eddies (at time step k-1)"

Reply: thank you.

Line 97. ". . where L denotes the number of pixels . ."

Reply: thank you.

Line 103. "runtime. Results . ."

Reply: thank you.

(2.2 Eddy identification)

Line 123. ". . identified as multinuclear . ."

Reply: thank you.

Line 150. I think cyclonic eddies have lowered sea-surface, i.e. SLA < 0, etc. So ". . SLA < -3 cm for cyclonic eddies and SLA > 3 cm for anticyclonic . ."

Reply:suggestion followed.

Line 153. Omit "those"

Reply: thank you.

(2.3 Eddy segmentation . .)

Line 156. ". . eddies. Different"

Reply:thank you.

(3.2.1 Eddy similarity)

Lines 233-234. ". . When we apply GEM . . Pacific Ocean (section 4.1), we choose . ."

Reply: thank you.

Lines 235-242. In figure 6(a) the subscripts (1,2,3,4) in E1, . . E4 are very small. I suggest you use E1, E2, E3, E4 (no subscripts) in the figure and in the text here.

Reply: suggestion followed.

Lines 245-249 and Figure 6a. The description seems to correspond to rc about 0.4 or less. E.g. S12/S1 $<\frac{1}{2}$ and with rc = 2/3 this would be case T2 not T3. Also S13 ~ ½ and with rc = 2/3 this would be case T0 not T2. You might find it easier to say rc = 0.3 than to re-draw the figure but re-drawing for rc = 2/3 would be less confusing for the reader.

Reply: figure 6b is redrawn now.

Lines 246-247. "..different relationship ("splitting", marked as T2 in Fig. 6b)..."

Reply:thank you.

(3.2.2 Eddy Look-ahead)

Lines 259-260. "..procedure. Examples for a given eddy.."

Reply: thank you.

Line 263. "..In the middle row, eddy Ec1 has two"

Reply: thank you.

Line 265. "In the lower row, eddy Ec1 has T2 ..and T3 .. (respectively Ec2, Ec3)". [E1 -> Ec1] But in the figure Ec2 and Ec3 are the other way round! Better to change the figure so Ec2 <-> T2 and Ec3 <-> T3.

Reply: suggestion followed, figure 7a is redrawn.

(3.3.1 Eddy branch)

Lines 299-300. "..high for the record of eddy C to be appended to either parent. There might be .."

Reply:thank you.

(3.4 Runtime (?!))

Reply: we modified to "computer time".

Line 329. "..much less than .."

Reply:thank you.

(4.1 Eddy tracks)

Line 362. "trajectory from .."

Reply: thank you.

Line 371. "..application of our similarity vector .."

Reply: thank you.

Line 373. "..application of the similarity vector .."

Reply: thank you.

Line 374. "..as a scalar .."

Reply: thank you.

(4.2 Eddy merging and splitting)

Line 386. "..(Fig. 5).."

Reply: thank you.

Line 387. "..location south of B1 and B2 .."

Reply: thank you.

Lines 388-389. "..After that, eddy B2 merged into eddy B3 .. eddies B1 and B3 eventually merged .."

Reply: thank you.

Line 395. Omit "which is". [A general point; "which" must follow immediately after the item it refers to. So here the meaning is clearer without "which".]

Reply: thank you.

Line 397. "..eddies (A1, A2; B1, B2, B3) are anticyclonic, they have clockwise rotation and orbits, like point vortices"
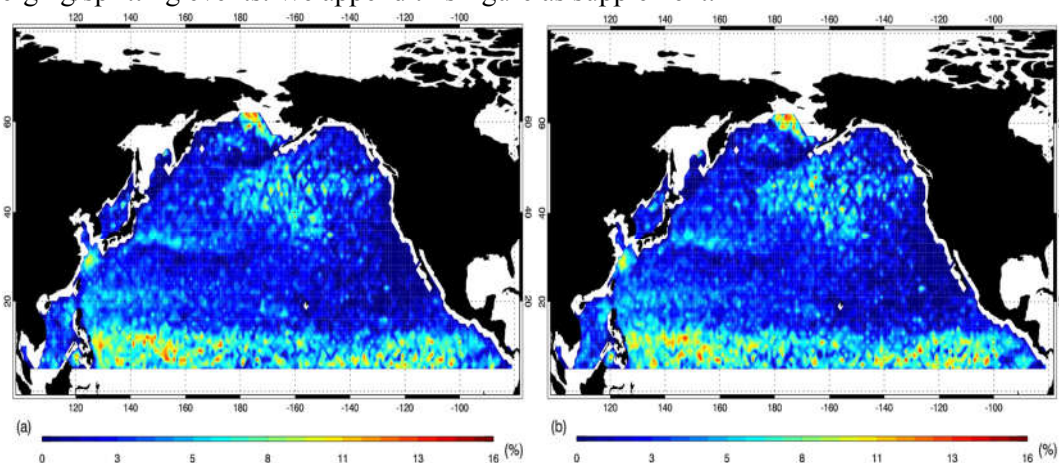
Reply: thank you.

(4.3 Census)

Line 403. "..Figure 12 and are similar .."

Reply: thank you.

Lines 417-418. I do not see "high frequency of merging and splitting" in the "eddy desert" in Figure 12. It might just be "high frequency" relative to the number of eddies but that is not enough to explain the lack of eddies.

Reply: The present figures lost such information as we draw absolute frequency of merging/splitting events by following reviewers suggestion. However, the previous figures (removed by review comment) have such information as we drew relative frequency of merging/splitting events. We append this figure as supplement.

The frequency of dynamic al processes, normalized by the number of eddy. (a) The merging frequency for cyclonic eddies. (b) The splitting frequency for cyclonic eddies.

Lines 419-420. "..may be due to eddies being too small to be detected or to eddy lifetimes being too short .." [You cannot have a "fact" about eddies that you do not know about.]

Reply: suggestion followed. It has been modified.

Lines 423-425. "..regardless of eddy polarizations .. splitting events increase approximately linearly with eddy lifetime. However, merging and splitting events are more frequent for anticyclonic eddies than for cyclonic eddies." Please note that there is duplication with the figure caption lines 744-745. I think this is better here because it is interpretation not explanation of the figure.

Reply: suggestion followed.

(5.1 Data noise)

Line 435. "As a sensitivity test .."

Reply: thank you.

Line 441. "..even when it is small. It might .."

Reply: thank you.

(5.2 Impact of variations . .)

Lines 456-457. These numbers of splitting and merging events do not agree with figure 15b. Perhaps 121220 and 120612 respectively?

Reply: Sorry for that. It is a typo in data. We modified it.

Lines 465-466. "．．reasonable. On the one hand, ．．．we know there is error (~10%) in calculating eddy area since．．consideration．．．"

Reply: suggestion followed.

Lines 469-470. "．．N=1 and N=2 have respectively 95.5% and 98%．．for N=4. To reduce．．"

Reply: suggestion followed.

Line 473. Omit "of"

Reply: thank you.

Line 474. "．．independent of MEI．．"

Reply: thank you.

Line 475. "．．in eddy identification．．．"

Reply: thank you.

Lines 475-476. "．．is more sensitive．．than is SLA-based GEM, since．．"

Reply: thank you.

Line 477. "．．independent of N, ．．"

Reply: thank you.

Line 478. "．．too large, eddies may move too far so that eddy"

Reply: thank you.

Line 479. "constraint"

Reply: thank you.

(5.3 Impact of eddy boundary)

Lines 488-491. "Different identification methods may give different eddy boundaries, although the eddy centre is relatively robust. Eddy area S is sensitive to eddy boundary but it is difficult to compare directly the influence of eddy boundary differences that result from identification method choice. However, the area ratio．．" [I have rearranged these lines. I have also omitted the sentence about "indirect way"; it does not seem to help.]

Reply: thank you.

Line 497. "However, such a sensitivity test．．values used in the same"

Reply: thank you.

Line 505. "．．eddy boundary differences resulting from using．．"

Reply:thank you.

(5.4 Future research)

Line 513. "Eddies identified by using algorithms without watershed segmentation can also be tracked .."

Reply: thank you.

Lines 516-517. "．．because most merging/splitting occurred between eddies more than a certain distance apart. This weak interaction．．" [I am not sure about "more" but assume this from "weak" interaction. If the eddies need to be close for merging/splitting then "less" not "more"].

Reply: we didn't use "more than.."

516   some far distance could still be recorded, because most of merging/splitting records occurred at the interaction of

517   two eddies with a certain distance. This weak interaction still can't be recorded by previously interaction-free

Line 524. "…physical quantities (…"
Reply: thank you.
Line 527. "…other than simple estimation from identification."
Reply: thank you.
Line 539. Omit "on those problems"
Reply: thank you.
Lines 551-552. "…and in "eddy deserts"…" This was not obvious to me (seem comment on lines 417-418).
Reply: thank you.

(Figures and captions)
Line 664. July 26 to August 3.
Reply: thank you.
Figure 4. In figure, "territory" -> "domain"
Reply: figure redrawn
Figure 5b. Add "B2" eddy label.
Reply: B2 is added
Figure 6a. See comment on lines 235-242. The subscripts (1,2,3,4) in E1, …E4 are very small. I suggest you use E1, E2, E3, E4 (no subscripts) in the figure here and in the text.
Reply: figure is added
Lines 744-745. See comment on lines 423-425. Repetition! I think these two sentences are interpretation, should be in the text and are not needed here.
Reply: removed.