Dear Reviewer,

We appreciate your precious time in reviewing our work. Your valuable and insightful feedback has improved the manuscript. We have carefully considered your comments below in black and tried to address them point-by-point in red. We refer to a modified pdf where all the modifications are highlighted in red.

1. My main comment is that the sections of the paper could be re-aranged in a more traditonal way while keeping the same content.

For example, Section 3 - Results, is actually a "Results and Discussion" section since the results are discussed with it (and at the moment, there is not a real Discussion section)

We agree with the reviewer, and therefore we replaced the section "Results" with "Results and Discussion" as we discuss the results in the same section.

2. Section 4 is a bit floating... I wonder if it is really needed (it is interesting, but personally I would remove since it is only based on a single deployment of 3 drifters).

In this analysis we are not testing the assimilation accuracy method that has been developed for this region, but we are evaluating the robustness of our classification in case of eventual data correction. This analysis showed that the clusters are consistent regardless the used data (corrected or not). After correction, the classification shows no significant change in the clusters.

3. There are also a lot of figures. They are all discussed and potentially interesting, but it is a lot…

We reduced the figures numbers by:

- Merging figures 1 & 2

- Merging 3 &4

- Put figures 8 & 10 in appendix

-- Other Specific comments --

Introduction and Figure 1: An improved larger map with the political boundaries is needed. This will help the reader not familiar with the region.

We modified the old figure 1 by showing a larger map with the political boundaries. We also merged figures 1 and 2 to reduce the number of figures.

Paragraph starting L.35: This seems a key aspect and could be introduced better.

We added a sentence (line 35) (Additionally, there is a previous contradictory assessment of the presence of the Mid-Mediterranean jet (MMJ, see fig. 1A) (Ciappa, 2021), which is described as a surface current meandering across the Levantine Sea)

- L.35: "debatable" (is there any reference to this?)

We added Ciappa 2021 (line 35)

- L. 50: 25-yr of altimetry: maybe cite "International Altimetry Team (2021), Altimetry for the

future: Building on 25 years of progress. Advances in Space Research. doi: 10.1016/j.asr.2021.01.022."

> Done (line 51)

- The acronym SOM is spelled out several times (L.53, 79, 97, 98, …)

> We removed all the spelled acronym

- L.53: The sentence starting by "It is use to" is badly constructed.

> We replaced the sentence by: One efficient method is the Self Organizing Map (SOM, (Kohonen, 2013)) … (see line 52)

- L.69: replace "till" by "and", and remove semi-colon ";"

> Done

- L.86: Mention how the altimetry product was accessed (e.g. Copernicus? accessed date? doi? Citation?) :

> Done (we added link as well as the spatial resolution in line 87) . "The velocity field spatial resolution is 0.125∘ × 0.125∘ (available on http://www.aviso.altimetry.fr/duacs/)."

- Figure 3: Should we see a spatial map here? Are the pixels organized as in Fig 2?

> This is a representation of the SOM, each subunit of this map represents neurons, and the organization of the neurons represents gradients that can be seen in the data. We added a spatial map to show how the clusters are projected on a daily geographical map (see figure 2G)

- L.134: Would be nice to have a better description here of the clusters. Later you say "high EKE" (clusters 1-2) or "high vorticity" (clusters 4-5) and this is useful. I would mention it here too.

> We added a sentence that summarizes all the cluster in line (133- 134). "In summary, C1 and C2 are clusters of strong-flow with high vorticity (high MKE and positive OW), C4 and C5 are clusters of strain dominated strong-flow (negative OW and high MKE), while C3 is the cluster of the weakest velocities."

- Section 2.4: I wonder if the study area should appear of the beginning of the method.

> Thank you for your suggestions, however, we preferred to leave the organization as is, because the definition of these regions is independent of the development of the method and is used to analyze mesoscale features.

- L.136: wrong construction with the sentence.

> Corrected

- Figure 4, 6, etc.: I would choose a different color scheme for the clusters. The 2 blues and 2 reds

are too similar (I printed the manuscript and you can't tell the difference). The colormap from Figure 11 would be best, for example.…

Thank you for your suggestions. We agree that the 2 reds and 2 blues were similar. To better distinguish between them, we changed the colors of clusters 1 and 5.

- L.138: "guided by the isobath" -> say which one.

We added the 3000 m isobath (see line 138)

L.160 and L.162: What you call "variation" is actually "standard deviation" and should be call this way.

Done we replaced by standard deviation (line 160 and 162)

- L.161: Replace "Depending" by "Based"

Done

- Section 3: It is really Results and Discussion...

We replaced Results by Results and Discussion (line 165)

- L.204 (whole paragraph): Maybe discuss a little bit more how the changes in satellite and sensors may have impacted (e.g. any abrupt changes corresponding to satellite changes?). Maybe also a good place to put your current Section 4 if you decide to keep it…

Done (We added Satellite along-track sampling accurately estimates the SSH … in line 211)

- L.221: Not sure how to interpret the sentence starting with "The along-slope…"

Because the previous sentence was explicit, we replaced it with "The intensity of the along-slope coastal flow showed (line 225) ".

- L.222: "C1 and C2" -> If I interpret correctly, it is mostly C2… (C1 in Egypt C2 Cyprus) To

We replaced the old paragraph with another one between lines 223 and 225 that mentions the areas of C1, C2, and C3 persistence.

- L.223: Here a map with political boundaries would help too.

We agree with the reviewer, therefore we added the political boundaries in Figure 1.

- L.230: "along its potential path" -> along or accross?

Across (line 231)

- L.254: You mean their distance to the "closest" isobath between 1000, 2000, or 3000m? (same comment for Fig 13 caption).

- L.280: Reasonable to conclude that is could be underestimated while only comparing a single event with 3 drifters? See before

See answer to main comment number 2