

Reviewer#1: Editor' Comments, Author Responses and Manuscript Changes

We would like to thank the reviewer for his/her careful reading and constructive comments on the manuscript. These comments significantly improved the manuscript. We have responded to the comments made by the reviewer in this document. We hope that the reviewer and the editor agree with the changes we have made to make the manuscript be suitable for publication.

In the following, black indicates the comments by the editor; blue is our response.

Comments:

This work brings together data from multiple platforms to characterise the structure of submesoscale dynamics along the Wadjemup Continental Shelf and their impact on biogeochemical tracers of chlorophyll and oxygen. I commend the authors for assembling a diverse observational dataset that provides multiple lines of evidence for submesoscale features and their biogeochemical signatures. I believe this work provides a useful contribution to the way that we observe submesoscale processes and their connection with atmospheric forcing. My main concern is about clarity of the message/text. While in many places the writing was clear, I found numerous instances, where the presentation of the results was rather challenging to understand and interpret. Additionally, the discussion could be improved with more connection to what this work advances. Still, I feel that this work can be published in Ocean Sciences after addressing the comments below.

Sensor calibration and data processing

- 1) It is not clear whether calibration was carried out for all sensors, particularly the oxygen. Please state the calibration procedures used, including for which instruments and when these were performed.

All data sets used in this study were from Australian data repositories where the data has already undergone calibrations and QA/QC procedures. We have included references to the calibration procedures on the text (see below)— in brief the sensors on the gliders were returned to the manufacturers for calibration whilst the shipborne data were calibrated using bottle samples. Note also that we are looking at relative changes in these parameters rather than absolute values.

- 2) Apart from the reference to the glider data processing, there is very little information on how data from the different platforms were processed. For reproducibility, please describe the key processing steps for all platforms (glider, moorings, ship-based measurements, radar, etc.).

We have included in the text the relevant references for data processing techniques.

Ocean gliders: Thomson, et al., (2026)

Moorings: Bui and Feng (2025)

Ship-based measurements: Pattiaratchi and Hanson, (2010).

HF Radar: Cosoli and Grcic (2024)

- 3) The method used to derive velocity from the glider data should be explicitly described (including assumptions, vertical averaging, and any quality control or smoothing applied).

We included the following in L195-202: Depth-averaged current (DAC) from the Slocum glider was estimated as the difference between GPS-derived displacement over a dive cycle and the glider's dead-reckoned displacement based on its hydrodynamic flight model, divided by the elapsed time (Rudnick et al., 2004). These techniques are included in the routines

provided by the manufacture There was no vertical averaging (they are depth mean currents) or smoothing applied (have a value every surfacing in our case every 2 hours). The quality control was only to check the values of derived velocities are within an acceptable range (e.g. $0 < DAC < 0.5 \text{ ms}^{-1}$).

Use and presentation of mooring data

- 4) L247: The location of the mooring relative to the peddie is not shown. Please clarify the role of the moorings in this context and show their positions relative to the eddies.
Done.
- 5) L286: Mooring sites are not indicated on the corresponding figure. Readers should not need to translate GPS coordinates from the methods into figure locations; please add the mooring positions directly to the maps.
Done.
- 6) L319: The locations of the moorings are again unclear at this point; please ensure all relevant figures clearly show them (including on Figure 1c).
Done.

Clarity and readability of results

- 7) I found the results section, and in particular Event 2, difficult to follow because the text frequently refers to multiple different figures for a single point, and many figures lack clear labels. This made it challenging to track where the eddies and moorings are and to interpret the data. For all events, please ensure that all glider, mooring and ship locations are shown on the relevant maps and clearly referenced in the captions.
We included labels on each eddy and included eddy tracking algorithm and mooring information in figure captions.
- 8) For Event 2, I suggest revisiting the structure of the section. Try to make it clear in each step where the eddies are and which observations are being used. For instance, use the eddy-tracking algorithm described in the methods to plot eddy positions/contours directly on the figures.
refer response to question #7.
- 9) Consider combining some figures so that the reader can see all relevant information (eddies, moorings, glider tracks, etc.) on fewer pages. I regularly had to assess figures on 2/3 different pages to understand a single point. This would improve the readability.
Done. The following figures were combined: 8 and 9 (now Figure 8), and 11 and 12 (now Figure 10). Previous Figure 10 is now Figure 9.
- 10) Provide enough information in the captions so that each figure is understandable without extensive cross-referencing (see detailed figure comments below).
Done.

Figure axes, symbols and labelling

- 11) Many figures (e.g. Figures 5, 9, 10, 14) lack x-axis labels. Please indicate what the x-axis represents (time, distance, etc.), including units. This is essential for interpreting the oscillations and spatial/temporal scales shown.

Done.

- 12) Figure 5: Could you please comment on whether the oscillations shown are at all related to internal tides or gravity waves.

These oscillations refer to glider capturing the internal structure within the peddie and it is not related to internal tides or gravity waves. Note that in Fig5b – the glider traverse around the peddie and this is reflected in the uplifting of the isotherms and isohalines. The time scale correspond to the glider motion.

- 13) Figure 6: Please explain what the circles and contours represent.

Figure 6 caption now includes their explanation in L358-363 as: “Figure 6. (a-h) HFR-derived Rossby number (in colour) and surface currents (vectors) occurring on 16-21 April 2010. (i) Sea Surface Temperature, (j) SCC, and HFR-derived surface currents (vectors) on 19 April 2010. In (a-h, j), mooring locations (Fig. 1c) are shown as black squares. **Red dots and thicker black closed contour lines in (a-h) represent eddy centres and their shapes detected by the vector geometry algorithm.** CE and AE in (a-h) refer to Cyclonic and Anti-cyclonic eddies, respectively.”

- 14) Figure 8 and 9: Consider combining these and reducing the total number of maps if possible; do all nine panels need to be shown to demonstrate the eddy?

Done.

- 15) Figures 9 and 10 (and others): Ensure that all axes are labelled with quantity and units, and that any symbols (squares, circles, ellipses, white squares, etc.) are clearly explained in the captions.

Done.

Physical interpretation and novelty of the results

- 16) L363: The “peddie” referred to here cannot be clearly identified in the glider data as presented. Please show more explicitly how this structure appears.

We included peddies labels on Fig. 13 (now Fig. 11) to ease their identification.

- 17) L414: You state that the eddies are in cyclostrophic balance. Can you provide more evidence for this. Please provide the diagnostics used or otherwise justify this statement more quantitatively.

We included Section 4.3 in Discussion regarding Rossby number sensitivity and Centrifugal and Coriolis force balance.

- 18) Overall, the discussion currently reads largely as a summary of the results. It would be strengthened by making clearer what is new about these observations compared to previous work on submesoscale eddies, emphasising how combining multiple observational platforms advances understanding of submesoscale processes and their biogeochemical impacts, and clarifying, where possible, the connection between submesoscale upwelling/eddy activity and dense shelf water outflows; the current link is rather qualitative and vague.

We have expanded the Discussion to clarify the main advances of this study. In particular, we highlight that the simultaneous use of HF radar, gliders, moorings and ship observations provides a rare multi-platform view of submesoscale dynamics and their biogeochemical signatures. This allows us to link the observed eddies with oxygen and chlorophyll anomalies

and to suggest a mechanism connecting submesoscale upwelling with dense shelf water export.

- 19) Check the definition and consistent use of DWST across the manuscript.
DWST definition was checked and its use was corrected across the manuscript.

Specific line-level comments

- 20) L252: There is no M-Chl data shown, although it is mentioned; this appears to have been omitted. Please include it or revise the text.
M-Chl data, shown in Fig. 4a, is now mentioned in L297-299 as: “The peddie on August 3 was characterised by colder water uplifting from 185 m to 40 m depth, with a slight decrease in bottom M-Chl ($<0.5 \text{ mg m}^{-3}$; Fig. 4a) and eastward (northward) flows (Figs. 4b-d).”
- 21) L131, L164, L280, L303, L424 and Table 1: Several typographical or grammatical errors were noted here; please proof-read these and the rest of the manuscript carefully.
Thank you for your comment. The manuscript was carefully proofread, and typographical/grammatical mistakes were corrected.

Figures

- 22) Please make figure captions fully standalone. Each caption should clearly describe the variables plotted, contours, markers and symbols, units, dates/time period, platforms and data sources, and any key processing choices.
Done.
- 23) Figure 1c: Please add the mooring locations here to help orient the reader.
Although mooring locations were already shown in Fig. 1c as black-white squares, we added few modifications in Fig. 1c to make them more evident.
- 24) Figure 2: The caption refers to a red line in Fig. 2c and a black square in Fig. 2f, but these are not visible; please either add them or correct the caption.
Figure caption was corrected in L305-308 as: “Figure 2. Remotely sensed (a-c) SSC, (d-f) Sea Surface Temperature and HFR surface currents (vectors) on 2-4 August 2010 (Event #1). The black dots represent HFR shore stations and the black-white square in (a) represents WACA20 mooring location (Fig. 1c). Red solid line in (b) is a ship transect on 3 August, and the black square in (e) represents the peddie location.”
- 25) Figure 10: The colour scheme used for temperature differs from the map and sections; please use a consistent palette for the same variable throughout the manuscript and explain what the squares in the map represent.
Done.
- 26) Figure 12 is currently not referenced in the text.
Fig. 12, now referred as Fig. 10, is described and mentioned in the text in L405-407 as: “Even under weak currents ($<0.3 \text{ m s}^{-1}$; Fig. 10h-i) and strong Rossby number ($Ro > 5$), higher G-Chl and oxygenated waters prevailed close to the seabed (Fig. 10).”.
- 27) Figure 14: It is not clear whether this is glider data, what the x-axis represents, or where the glider was deployed. These need to be specified.
Done.

- 28) Please consider using colour-blind-friendly colour schemes for all figures and avoid divergent colour maps for variables that are not naturally centred around zero, as these can be visually misleading. Sequential colour maps or perceptually uniform schemes are more appropriate for strictly positive variables such as salinity or chlorophyll.

Thank you for your suggestion. We have updated the figures.

- 29) The abbreviation for metres per second is inconsistent (ms^{-1} vs m s^{-1}). Please apply m s^{-1} uniformly. Check all units again.

Done.

- 30) There is inconsistent spacing between numbers and units (e.g. “200m” vs “200 m”). Please adopt the journal convention and apply it throughout.

Done.

Reviewer#2: Editor' Comments, Author Responses and Manuscript Changes

We would like to thank the reviewer for his/her careful reading and constructive comments on the manuscript. These comments significantly improved the manuscript. We have responded to the comments made by the reviewer in this document. We hope that the reviewer and the editor agree with the changes we have made to make the manuscript be suitable for publication.

In the following, black indicates the comments by the editor; blue is our response.

Major comments:

This manuscript presents a very interesting dataset showcasing multiple eddies along and across the continental shelf of Western Australia. It is relatively rare to see such detailed three-dimensional observations of very small (“petite”) eddies, and this aspect alone makes the study valuable. Moreover, the authors combine multiple observational platforms, which is never trivial, and the effort to bring them together into a coherent description of the eddy structure is appreciated.

That said, I found the manuscript difficult to follow and lacking a clear central objective. Beyond illustrating the diversity of eddies observed, the main scientific question is not clearly articulated. What is the overarching goal of the study? Is there a way to compare the eddies more objectively and derive a set of characteristic properties, or process understanding, rather than listing and describing them individually? A clearer framing of the aims, together with a more structured comparison among cases, would greatly improve the manuscript.

In its current form, the analysis remains largely descriptive and somewhat shallow. While the observational detail is valuable, the manuscript misses an opportunity to move beyond description and extract more general insights into eddy structure and their biogeochemical impacts. A more synthetic analysis, identifying commonalities and differences, quantifying key metrics, and situating the results within the broader literature, would substantially strengthen the contribution of the study.

The presentation itself also requires improvement. Several figures are difficult to interpret (e.g., missing axis labels, incomplete captions, inconsistent spatial or temporal extents, fragmented panels). In most cases, it is not easy to identify or track the eddies along the time or space axes. Improving figure clarity and consistency, and more clearly highlighting the eddies within the visualizations, would greatly enhance readability and accessibility.

In conclusion, the dataset is interesting and potentially important. However, in its current form, the manuscript remains primarily descriptive and lacks a clear, well-developed scientific focus. I therefore recommend rejection at this stage, to give the authors the opportunity to substantially restructure the manuscript, clarify its main objectives, and develop a stronger and more synthetic analysis.

More suggestions and line by line comments are below.

Main specific comments:

1. Regarding the lack of story, here are potential suggestions. First, chlorophyll seems to be a focus of the manuscript. One interesting angle could be to investigate the advection versus production of chlorophyll through eddy uplift, or even wind-driven upwelling. A clear quantification (relative to seasonality), and clear identification of the bloom location (centre

versus periphery), and whether this changes over time would be adding to the current knowledge on the topic.

We agree that a more clearly defined focus improves the manuscript and have Re-defined the aims as follows:

“In this paper, we use a multi-platform approach to investigate the internal structure of sub-mesoscale eddies (<10km diameter) and peddies (i.e., ‘petite’ eddies; diameters ≤ 10 km extending through the water column) along the Wadjemup (Rottne) Continental Shelf. In particular, we aim to: (1) characterize their physical and biogeochemical structure and determine whether these features display consistent signatures across observations; and, (2) evaluate how these eddies influence chlorophyll distribution on the shelf.”

2. The manuscript mentions a few time upwelling/ downwelling, both from the wind, and within the eddies. Is it possible to infer something about their relative importance in the region? There seem to be anticyclonic eddies with upwelling winds, which is interesting. Although table 2 is missing the eddy rotation direction.

We defined our aims as described in question #1.

3. Another angle that could be explored is the isotherm uplifts, which, in addition to the Rossby number and eddy radius, is the only quantification provided. It would be nice to compare these values, and try to extract something general, ideally in a figure (maybe isotherm uplift versus chlorophyll anomaly, Rossby number or eddy radius)? I am sure the authors can come up with other ideas to give some depth to the manuscript.

We defined our aims as described in question #1.

4. The other processes that are mentioned are eddy generation (“spawned eddies”) and evolution, but it feels like these are not clearly supported by the dataset, which is a shame. Although we analyse cases depicting eddy generation (e.g., Event 1) and evolution (e.g., Event 3), this is not the main focus of the manuscript. Our aim is to investigate eddy internal structure, particularly their biogeochemical signatures, and expand on the role of physical processes on shaping their dynamics. We did previous investigation on the occurrence, properties and generating mechanisms of sub-mesoscale eddies in Wadjemup Continental Shelf in Bitencourt et al. (2025), and we aimed here to expand on some cases to mainly see the role of the winds in their internal structures, for instance.

5. Regarding the Rossby number, I understand why different methodologies are used to estimate it, but it needs a sensitivity study. Is at least one eddy which was observed by multiple datasets could be used as a test case to quantify the impact of the method used.

We included Section 4.3 in Discussion regarding Rossby number sensitivity and Centrifugal and Coriolis force balance including Ro sensitivity analysis that you have suggested.

6. For a manuscript largely on sub-mesoscale, it is frustrating to see the lack of consistency in the suggested definition (20km in the abstract, <50 km page 2 and 4, then <20km diameter page 4, <50km diameter p. 9). I would also expect a mention of the Richardson number for sub-mesoscale.

Eddy size definition was updated along the text as sub-mesoscale <20 km, and we have checked the manuscript for consistency throughout.. In addition, Richardson number definition was included in L46.

7. Finally, some work needs to be done on the formatting and presentation. Table 1 has a whole useless column for units, which could be replaced by the depth of measurements. Table 2’s last column has different formats for dates and radii and misses an opportunity to list the

rotation direction and other parameters (e.g. isotherm uplift). Figures are hard to follow. Please specify the event number in the caption, and please add a line to show the eddy timing. Table 1 is now updated including depth of measurements and excluding units. We also included rotation sense, Rossby number, and vertical uplift in Table 2, included event number in each figure caption and their respective eddy timing.

Specific comments to the authors

8. 1. 30-50: There is a transition missing between the general sentence in oceans and cross-shore transport which specifically refers to continental shelves.
The following transition sentence was included in the text (L30-42):
“Mesoscale and sub-mesoscale features are ubiquitous in the world’s oceans, acting as reservoirs and pathways of 90% of the ocean’s kinetic energy (Carpet et al., 2008; Chelton et al., 2007; Ferrari and Wunsch, 2009; Fu et al., 2010). They are crucial for maintaining energy balance across scales (Chen et al., 2023) and transporting heat, momentum, mass, and biogeochemical tracers in the oceans, also promoting biodiversity in marine ecosystems (Damien et al., 2023; Levy et al., 2018; Mahadevan, 2016). **In continental shelf regions, these processes also facilitate exchanges between offshore and coastal waters.** Through cross-shore transport, they contribute to carbon export and the fate of particulate organic carbon and biogeochemical budgets (Mahadevan, 2014) with important implications for plankton, fisheries, and fisheries management (Akpınar et al., 2020; 2022; Guerrero et al., 2019; Irigoien et al., 2007). Sub-mesoscale eddies contribute to nutrient cycling, primary production, structure and functioning of phytoplankton ecosystems in coastal areas (Fig. 1a; Lévy et al., 2001; Davila et al., 2021; Mahadevan and Tandon, 2016; Oguz et al., 2015; Veatch et al., 2024).”
9. **Fig. 1:** How is along-shelf velocity defined?
As current flow tends to follow the coastal boundary, the cross-shore (u) component is much smaller than the alongshore component (Brink, 2016; Lentz, 2022). Thus, the alongshore (v) component was used here to provide representation of current variability in the region, as we previously adopted in Bitencourt et al. (2024).
10. **Fig. 1:** The colourbar for glider missions is confusing: it looks like e.g. “7” in red means that there are 7 missions along that line.
Number of glider missions was corrected to “# Glider events”.
11. 1. 73: Explain why the current is “anomalous”.
Anomalous refers to the poleward-flowing characteristic of Leeuwin Current. This eastern boundary current flows against the prevailing equatorward winds and favours downwelling along the coast, which is the opposite of what commonly occurs along the path of eastern boundary currents.
We included the following sentence in L100-102 to clarify this definition: “Thus, the anomalous poleward-flowing LC, that inhibits large-scale upwelling, contrasts with the equatorward-flowing upwelling-favourable currents typically found along the eastern boundaries of ocean basins.”
12. 1. 76: which remote forcing?
We are referring to large-scale wind patterns, tropical cyclones, coastally trapped waves etc.
13. 1. 78. Is this daily maximum wind speed?
Yes, now updated in the text.

14. 1. 100: Please avoid the sentences with contrasting ideas in brackets.
We rewrote the sentence as: “LC is stronger during La Niña periods and weaker during El Niño periods (Bitencourt et al., 2024; Pattiaratchi and Siji, 2020). In contrast, eddy activity, CC and southerly winds are weakened during in La Niña years and strengthened during El Niño years (Bitencourt et al., 2024; 2025).”
15. 1. 140: Specify which year.
Done.
16. 1. 154: These mooring names are very confusing (WATR40 in 40m, WATR05 in 50m)! Too late to change?
Done. Now we refer to moorings at 40 m and 50 m depths as WATR04 and WATR05, respectively.
17. 1. 168: 1000x1000 grid... which resolution?
The data were interpolated onto a grid with a resolution of 0.2 m in the vertical and 4.3 minutes in time. This info was already included in the text.
18. 1.145. Low-pass filter for which frequency?
We used the Butterworth filter with a cutoff period of 33 h to remove high frequency signals (Bitencourt et al., 2024).
19. 1.182. Is it not level 4 product? Skin or foundation SST?
This SST product is a multi-sensor and swath, day-only SSTskin, ~2 km spatial resolution product (IMOS-SRS SATELLITE-SST L3S-01 days composite from GHRSSST; Bitencourt et al., 2024).
20. Section 2.8. Please re-order: as it states, it starts with the Rossby number, then vorticity, then Rossby, then finally explained the notation line 211... It is very confusing.
As suggested, Section 2.8 was re-ordered to improve its clarity.

Results

21. 1. 230: Do you really have eddies of 1km diameter? Would that be 4 grid point with the greater resolution you have (glider)?
Yes.
22. 1. 235. Any insight on the “appearance” of the peddie? Specify the year.
This peddie “appearance” is shown in detail in Fig. 3a with high chlorophyll concentration and clockwise rotation sense and were depicted in 02-03 August 2010, which is now included in the text.
23. 1. 245. It also looks like high DO in the peddie. Why?
High N-Chl inside the peddie is an indicative of phytoplankton production and its related photosynthesis, which is the direct source of oxygen to the system. High DO concentrations within these eddies (e.g., Fig. 5) are consistent with enhanced photosynthetic production relative to local biological consumption. We included this information in our discussion section.
24. 1. 247: I can’t see the vertical uplift.
The ~100 m uplift is shown in Figure 4; however, we agree that this may not have been sufficiently clear from the original caption and text. We have therefore expanded the figure caption and added the corresponding date in the text to better guide the reader.

25. 1. 250: Why would upwelled water have high DO?
Please, refer to question #23.
26. **Fig.2:** Please show the centre of the eddy and specify the eddy event in all captions (and eddy number when there are many).
Due to amount of information in Fig. 2, we decided to show the peddie in detail, including its centre, in Fig. 3a. In addition, a black square in Fig. 2e highlights the peddie location. However, we agree that the respective eddy event should be included in the figure caption and it is now updated.
27. **Fig.3:** Add the mooring location (same for each figure which showcases mooring data). The caption does not mention the velocity vectors in panel a).
In this specific figure, we decided to include mooring information on Figure caption (mooring name and its reference to Figs. 1c, 2a). In other eddy events, mooring locations are explicit in the figures and their respective Figure caption.
28. **Fig.4:** Missing the year. I struggle to see the timing of the eddy.
Date and respective eddy event is included in the caption of Figure 4. As we are plotting timeseries of four days, we decided to use daily markers to ease the understanding. Eddy signatures (or timing of the eddy) are seen in inversions in u, v components and water uplift in temperature, for instance.
29. 1. 289: Why a downwelling signature with southerly winds?
Despite the wind direction, downwelling signatures are expected in anti-cyclonic (counterclockwise) eddies and it is what we see. However, our results also showed in event #2 that the internal structure of anti-cyclonic eddies can also promote upwelling, possibly related with a cyclostrophic balance state, and winds can also affect eddy life cycle.
30. 1. 298: I can't see the 100 m uplift.
We thank the reviewer for this comment. The ~100 m uplift is shown in Figure 7g; however, we agree that this may not have been sufficiently clear from the original caption and text. We have therefore expanded the figure caption and added the corresponding eddy number in the text and Figure 6 to better guide the reader.
31. 1. 300 paragraph. Very hard to follow with all these eddies not marked in the figure.
Thanks for your comment. We included labels for each eddy in Fig. 6, also including their eddy type.
32. **Fig. 6:** Surprisingly elongated Rossby numbers, as opposed to circular eddies. Are they really matching?
This is an artifact and limitation of the eddy detection algorithm, as is the case in other algorithms as well. However, it is indeed challenging to systematically quantify how often such cases occur, as it depends on the data and spatial variability of oceanographic conditions to fit in the four constraints of the algorithm. We performed statistical analysis in eddy synthetic fields in Bitencourt et al. (2025) – Appendix A and, overall, the eddy detection and tracking algorithm showed a good performance in capturing eddy size and evolution. Thus, we are confident this does not affect our results.
33. 1. 346 “A glider... was”
Done.
34. **Fig. 12:** I am not sure what to get from this figure.

Figs. 12h,i provide more context to the peddie depicted by the ocean glider in Figs. 12a-c. In fact, it shows variations in ocean currents when the peddie passes by the mooring.

35. **Fig. 15:** missing x-axis labels.
Done.

36. l. 376: Maybe I am looking at the wrong time, but I can't see chlorophyll uplifted in figure 14 during the eddy.

Although, peddies did uplifted G-Chl waters, G-Chl peaks were not necessarily linked with peddies uplifts. In fact, G-Chl concentrations within peddies were not substantially high ($>1 \text{ mg m}^{-3}$) in these uplifts to show great contrast in the water column.

37. The discussion is very general and just lists possibility of scenarios.

We have expanded the Discussion to clarify the main advances of this study. In particular, we highlight that the simultaneous use of HF radar, gliders, moorings and ship observations provides a rare multi-platform view of submesoscale dynamics and their biogeochemical signatures. This allows us to link the observed eddies with oxygen and chlorophyll anomalies and to suggest a mechanism connecting submesoscale upwelling with dense shelf water export.

38. l.425. Rewrite the sentence, I think it is unfinished.

This sentence is now (L499-501): "Previous work showed that southerly or southeasterly winds of $\sim 7\text{--}8 \text{ m s}^{-1}$ enhance pre-existing shear zones and promote the formation of sub-mesoscale eddies, whilst stronger winds ($>11\text{--}12 \text{ m s}^{-1}$) tend to disrupt or dissipate these structures (Bitencourt et al., 2025)".

39. l.430: You did not show the destabilization, nor eddy shape evolution, even less how it is linked to the wind evolution.

As a suggestion from the other reviewer reviewer, we are illustrating three selected snapshots of eddy spatial and temporal variability, we do show when the eddy becomes unstable until it dissipates as the wind intensified, both captured by the HFR and ocean glider measurements (Fig. 8).

40. l. 445: That is interesting, although very hard to infer from the multiple figures. If you add the Rossby number, eddy rotation direction, and vertical uplift in the table 2, maybe it will be clearer.

We have rearranged the manuscript and included such properties in Table 2.

41. l. 453. "High horizontal shear areas" and "life-cycle": none of them were explicitly shown.

We refer as "high horizontal shear areas" those regions with high relative vorticity/ Ro , such as in the interface between LC-CC and the periphery of mesoscale eddies (e.g., Fig.2), but we understand that this concept was not clear in the text. Eddy lifecycle referred here, although not in detail, is illustrated in Figs. 2, 10, for instance, which specifically show such concept.

42. "Anti-cyclonic eddies promote both downwelling and upwelling": interesting, but not obvious in the manuscript with the current organisation.

We have rearranged the manuscript to better deliver and highlight our message.