Author's Response for RC2

MAJOR COMMENT

This study presents an analysis of the surface and subsurface characteristics of mesoscale eddies observed during eight Seaglider missions near the Perth submarine canyon. The authors combine in-situ measurements collected between 2010 and 2017 and remote sensing data to describe the interactions with nine mesoscale eddies. Detailed descriptions of the eddies' physical characteristics, such as temperature, salinity, chlorophyll concentration, and mixed layer depth are provided, highlighting differences between eddy types and their potential impact on local oceanography.

The dataset itself is compelling and valuable, revealing the potential for intriguing patterns such as the absence of anticyclonic eddies above the shelf. However, the current manuscript is limited by its mostly descriptive approach, with minimal scientific analysis beyond basic characterization of eddy features. While the observational data are rich and has the potential to yield substantial insights, the authors have not fully utilized this potential to extract significant scientific findings. Without new and significant findings, the paper reads more as an overall data report rather than a scientific study.

I recommend that the authors incorporate some statistical analysis of the data, moving the manuscript's results beyond a descriptive focus and exploring the eddy dynamics and interactions quantitatively. Metrics on eddy intensity, variability (seasonal?), or nutrient entrainment would add a valuable quantitative dimension to the work. An analysis of the relationship between eddy characteristics (such as chlorophyll concentration and temperature profiles) and regional physical processes could provide new insights. Such analyses would allow for a clearer demonstration of the eddies' impact in the region, helping to elevate the manuscript from descriptive to analytical work. It is up to the authors to decide what processes they want to study, but new scientific findings are necessary to be included.

As such, I recommend the authors make major revisions to the paper, addressing these issues and with the expectation that the authors would focus their revision efforts on the inclusion of further scientific analysis. After the authors undertake these significant revisions, this study could become a noteworthy contribution to our understanding of mesoscale eddies in this unique region.

Some additional minor comments related to several grammar and syntax problems in the paper are provided below, along with some other specific suggestions in addition to the major comment above. The authors will need to have the text edited carefully, removing all grammatical/syntax errors, before

it can be published. I would be happy to review an improved version of this paper if is submitted after editing.

Response: We sincerely thank the reviewer for their detailed and constructive feedback on our manuscript. We appreciate the recognition of the value and potential of our dataset, as well as the acknowledgment of the findings it reveals. The importance of moving beyond a descriptive focus to provide a more analytical exploration of mesoscale eddy dynamics and their impacts is acknowledged. However, accessing only field measurements using gliders limits the ability to undertake additional analysis. A companion paper, which is currently under review, has included more detailed statistics on eddy variability. Minor comments regarding grammar and syntax have been acknowledged, and these issues have been carefully addressed in the revised manuscript. To ensure the writing meets the high standards required for publication, a thorough review of the text has been conducted. Confidence has been gained that the revisions have significantly enhanced the quality and impact of the work. The reviewer's encouragement and willingness to review a revised version of the manuscript have been sincerely appreciated. A point-by-point response to all comments, including specific suggestions and minor corrections, has been provided with the revised submission.

MINOR COMMENTS:

Line 24: "oases" should be in quotations

Response: The sentence has been revised in accordance with the comment.

Line 43: add a comma after "WA"

Response: The sentence has been revised to include a comma after 'WA,' as per the comment.

Line 66-67: You state that the paper's aim is to define the vertical structure of the eddies you measured by glider. I am not sure if this aim by itself is enough to justify publication of this work. Your aim should be to show something new related to these measurements, and shouldn't be limited to simple description of the data. As a reader, at this point I hope to find more than a mere description of the eddies characteristics in the upcoming sections.

Response: The sentence has been revised to reflect a more focused approach on uncovering new findings related to eddy dynamics and their role in the ecosystem. One of the major findings is the higher SSC in anti-cyclonic eddies due to entrainment of higher SSC water from the continental shelf.

Line 110-111: Something is strange about this sentence, please rephrase/edit.
Response: The sentence has been revised in accordance with the comment.

Line 137-139: What is the likelihood of generating artifacts during the process of interpolation? More specifically, can you quantify the error introduced by detecting eddies onto a heavily interpolated field? Please address.
Response: This is not relevant as we have removed the eddy detection section from the manuscript.

Line 149-150: Incomplete sentence - please check & edit.
Response: The sentence has been revised for clarity.

Line 155-156: Sentence does not make sense, please rephrase.
Response: The sentence has been revised in accordance with the comment.

Lines 191-192: It is difficult to gather this form Figure 1b. I can see that there is a collection of anticyclonic eddies closer to the coast, but it is hard form the figure to tell if this is the majority of them. Can you report the number of on-shelf AC eddies vs. Off-shelf AC eddies here? (The only thing I can really gather form figure 1b is the absence of cyclonic eddies near the coast.)
Response: This is not relevant as we have removed Figure 1b the manuscript. We agree that it does not contribute to the aims of the manuscript.

Line 200: You've mentioned "cyclonic/anti-cyclonic" elsewhere in the draft - better to keep with that terminology throughout the paper to refer to rotation direction.
Response: The sentences have been revised throughout the paper to consistently use "cyclonic/anticyclonic".

Line 201: "(represented by yellow arrows in Figure 3)"

Response: The sentence has been revised in accordance with the comment.

Lines 203-206: Not clear, there are several grammatical and description issues in these lines. Please rephrase & edit. Please have this paper revised and corrected for English writing.

Response: The sentences have been revised to address the grammatical and descriptive issues.

Lines 431-433: Sentence is incomplete, please revise.

Response: The sentence has been revised in accordance with the comment.

Lines 435-439: The fact that cyclonic eddies associated with upwelling didn't indicate higher chlorophyll in this case is a potentially interesting finding that should be explored further. This is an opportunity to go beyond the mere description of the data and include some findings.

Response: We thank the reviewer for highlighting the interesting observation regarding chlorophyll concentrations. This finding has been recognized as a potentially significant deviation from the usual paradigm. In the revised manuscript, have expanded the discussion to highlight the implications of these findings.

Line 446: "Chlorophyll" (missing an L)

Response: The sentence has been revised in accordance with the comment.

Lines 446-449: Please reword this sentence, the mechanism it describes needs to be made more clear.

Response: The revised wording has been updated to provide a clearer explanation of how the higher chlorophyll concentrations in anticyclonic eddies result from the entrainment of chlorophyll-rich shelf waters, which are transported offshore as the eddy moves westward-see also new Figure 14c.

Lines 451-452: Check grammar.

Response: The sentence has been revised for clarity and grammatical accuracy.

Lines 452-454: Again, some awkward grammatical description. To be clear, the entrainment of productive water was not impeded – rather, the direct observation of whether it occurred or not is what was impeded. Please rephrase to state correctly.

Response: The wording has been revised for clarity in accordance with the comment.

Looking at Figure 13, what I can see is a filament of high Chl at the upper edge of the eddy coming from the coast (panel c). I can see it to a much lesser degree in panel b, but less convincingly. In panel a, how can you be sure that is entrainment?

Lines 463-464: Check grammar.
Response: The sentence has been revised for grammatical accuracy.

Figure 1: Panel "b" in its current spaghetti plot format is not useful to the reader. The eddy tracks plotted like this are not discernible, and the figure hardly provides any insight into the actual behavior of the eddies. I suggest reworking this figure into a more discernible plot, perhaps by making use of the mean pathways/directions or by otherwise cleaning up the way the eddy tracks are displayed visually.
Response: We have removed figure 1b.

Figure 3: Check this description for grammar, it is not correct as written.
Response: The description of Figure 3 has been revised for grammatical accuracy in accordance with the comment.

Figure 4: The way you've plotted these sections twice in the same figure (first from 0-900 m, then again from 0-500 m) is repetitive and unnecessary. Please choose only one depth range and eliminate the other (either 0-900 or 0-500). You can make better use of space for the figure that way and there will be no unneeded repetition. I leave it up to you how to reorganize the panels, but remove the repetition.
Response: Both depth ranges (0-900 m and 0-500 m) have been retained to provide clarity and support the description in the text, as this has been intended to highlight different aspects of the data. This approach has been chosen to ensure the entire data record across the transect is visible while allowing for a more detailed focus on the upper water column.

Figure 13: Check the colorbar on this figure: negative Chl values?
Response: The colorbar in Figure 13 has been presented in logarithmic scale, which is why it includes negative values. This has been clarified in the caption.

Figure 14: I do not think this figure helps. There is not much that can be gathered by this figure, except perhaps for some basic qualitative depictions. Aside from being shown an awkward scale and angle, it does not illustrate the characteristics of the eddies as you claim in the caption.

Response: The figure has been revised to address the concerns raised.