Reply on RC2

Below is a review of "modulation of internal tides properties off the Vitoria-Trindade Ridge during contrasted seasons from altimetry and a regional ocean model" by P. Bauchot and co-authors.

This paper uses an ocean model and historical altimeter data to demonstrate that mesoscale variability and seasonal stratification act jointly to modulate the coherence and energy pathways of internal tides.

I enjoyed this paper and found it interesting. I think the conclusions are reasonable based on the data and analyses presented and I have no major comments to offer in that regard. The main comments are either editorial in nature, or connected to a concept where you are assuming the reader understands what is being discussed.

I recommend accept subject to minor revisions. I would gladly re-read the paper post edits to ensure my comments were satisfactorily addressed.

My comments are enumerated below.

We thank the reviewer for reading our paper carefully and highlighting the points of improvement on which we have worked in the new version. Thank you for your positive feedback, which encouraged us to submit a paper of higher quality. Below you will find a more detailed answer to each of your comments.

- Lines 12-13 – "reflection beams" – what exactly are they? They are never defined in the manuscript. I've thought about internal tides for a while and it's a term I'm not familiar with. This term is used in other places in the manuscript where you assume the reader understands. I looked the term up in Google and I think I know what it is but I'm not quite sure. EGUsphere's readers are smart but not all specialists. They should get an explanation of what reflection beams are and how to see them in the results you are presenting.

  Thank you for your remark. We agree that the term "reflection beam" was not clearly defined in the original manuscript. In the context of internal tides, a reflection beam refers to a beam of internal tide energy that results from the reflection of a primary (incident) beam on ocean boundaries, such as the surface or topography. After reflection, the beam propagates away from the reflection point following the direction imposed by the internal wave dispersion relation.

  In our analysis, these reflection beams are identified as coherent structures in the SSH signal, corresponding to regions where baroclinic tidal energy remains concentrated along preferential directions. We have now included this definition at the first occurrence of the term (Section 3.1) to improve clarity for the reader.

- Line 26 – "in the climate regulation" – doesn't read well, either "the regulation of climate" or removing "the" reads better

  We updated this phrasing both in the introduction and in the conclusion.

- Line 32 – “one of the main responsible” – doesn’t read well, perhaps inserting “mechanisms” between “main” and “responsible”?

  Thank you for pointing it out. The word “driver” has been inserted into the sentence.

- Line 113 – “is in adequacy” – doesn’t read well. I was going to suggest a rewrite but I’m not completely sure of what you’re trying to convey.

  This is a language mistake, “in adequacy” has been replaced by “in reasonable agreement”.

- Line 132 – “2,5.10^-3” – I’m not used to scientific notation being presented this way. Can this be rewritten in more standard notation (e.g. .0025)?

  We have replaced the scientific notation by a more classical one.

- Line 156 – “The temperature and salinity profiles of the first 500 metres of the water column of TAPIOCA-36 appear really close to the ones reported by the WOA, which therefore make our model reliable” – this is at best a qualitative argument to claim “reliability”. Can you present a more quantitative case to justify this statement?

  We agree that this comparison is qualitative and does not constitute a full validation of the model. We have clarified this point in the revised manuscript and explicitly refer to Giachini et al. (2024) for a more comprehensive validation of TAPIOCA-36.

- Figure 3 – right panel. “temperature and salinity profiles of tapioca-36 against WOA data”. What am I looking at? A single location, a mean across all profiles? If you are presenting this as T-S validation of TAPIOCA-36, you should give more details. For example, numbers of profiles and mean and rms error statistics.

  These profiles come from the average of all density profiles available in 2008 in a box located over the internal tides region, which boundaries are from 20.5°S to 29°S in latitude and from 40°W to 33°W in longitude. The chosen box has been added to Figure 3 and this information have been updated in the associated paragraph and in the Figure legend for enhanced clarity.

- Line 173 – “box n° 3” – how about calling it box 3 – as is done in the figure?

  Based on your comment, we corrected it in the new version of the paper.

- Figure 5 – green and red line, at least in my printout appear muted and hard to differentiate. Please consider a better version with better colors see. Also, “signal barocline” in the label of the left panel should be changed to match the legend.

We are sorry that the colors of this Figure confused you. However, we didn't display any element of the Figure in the green color. The indications about the direction of propagation of internal tides as well as the location of the VTR on the graph have been put in blue instead of red. We hope it will be better for the reader's comfort. Thank you for pointing out the language mistake in the label. It has been corrected in the new version of the Figure.

- Starting at line 195 (as well as Figure 5) - There is a discussion of beams of reflection. I didn't fully understand the concept because it was never defined by the writers. It made this discussion nearly impossible to appreciate. My line 12 comments hold here too. Don't assume the readers understand a term, define it so they can appreciate what you're discussing. The readership of EGUsphere are smart nonspecialists.

  As mentioned in our previous comment, we took your feedback into account and defined the concept of "reflection beams" in this specific paragraph. We hope that it facilitates the understanding of our analysis.

- Line 207 – "we retrieved that almost 45% of the dissipation occurs locally" – are you trying to say that "we find that almost 45% ....."

  Indeed, thank you for your suggestion, we updated it in the new version of the paper.

- Line 233 – As the conversion rate C – I assume you mean barotropic to baroclinic? If so, please specify.

  Indeed, the conversion rate always refer to the amount of barotropic energy converted into baroclinic energy. We specified it in this paragraph, as well as in Section 3.1.

- Figure 10 – never mentioned in the text

  There was a mistake in the referencing of the Figures, which now has been fixed. Thank you for pointing that out.

- Figure 11 – what are the lines near -21 and -22? Should define in legend.

  The dotted lines represent the assumed reflection beams in the dissipation signal. This is now defined in the legend.

- Line 263 – "After three periods of internal tides". This confused me. Are you talking about 3 mode-1 wavelengths, which would be a distance or some sort of time interval? This is confusing and should be expressed more clearly.

  Line 264 – First period of reflection – not defined, so I have no guidance to interpret what this means.

Indeed, we acknowledge that it was not very clearly written. In the original version, "three periods of internal tides" was intended to refer to a spatial scale corresponding approximately to three mode-1 wavelengths, rather than a temporal period. Similarly, the expression "first period of reflection" was meant to describe the first reflection beam generated after the interaction of the internal tide with the surface.
To avoid this confusion, we have revised the text and now consistently refer to "reflection beams", which more clearly describes the spatial structure of the internal tide propagation and its variability.

- Figure 12 – Panel labels are way too small, they need to be increased in size. Also, you have a mix of (presumably) French and English, please be consistent (e.g., isopyncne).

  Thank you for your comment. We reworked the Figure to fix these issues.

- Line 294 – "period" – I think you meant "periods"

  Indeed, thank you for underlining this typo, we corrected it.

- Line 334 – "six beams of reflections" – commented on earlier.

  As it has been more broadly introduced earlier in the paper, we rephrased it by speaking of "reflection beams". We hope that the reader will understand at this point of the paper to what we are referring to. Thank you for your valuable remarks.

- Line 335-336 – "Altimetry allows to retrieve the wavelength of each mode of propagation: 140 km and 65 km for the first and second mode of propagation, respectively" – reads awkward, how about "Altimetry allows the retrieval of the …"

  Thank you for your comment. We rephrased this sentence for a better reading experience.