January 2022

Review of: **Internal tides off the Amazon shelf during two contrasted seasons: Interactions with background circulation and SSH imprints**.

Submitted to **OS** by: Michel Tchilibou, Ariane Koch-Larrouy, Simon Barbot, Florent Lyard, Yves Morel, Julien Jouanno, and Rosemary Morrow

An impressive work with a wealth of modeling efforts being put in a largely unexplored region for oceanography phenomena. Overall, this study presents the results of a high-resolution numerical model including tides and the essence of the oceanographic processes in that region (steep shelf bathymetry, Amazon discharges atmospheric forcing). The model validation seems good, but more importantly the model is indeed reproducing the main processes observed e.g. via satellite remote sensing and the variability therein. Therefore, the authors set out to explore that variability – in the Its – in light of the ocean background.

This region is practically unexplored in the framework of internal tides and internal solitary waves .These modelling efforts are new and expected to be highly valuable for forthcoming studies in this region, and in fact for new approaches in IT studies.

According to these findings, there are two contrasting seasons, in which IT energy budgets and dynamics (including generation, propagation and dissipation) are very different. The authors explain that variability in light of the also very different ocean background stratification and currents.

The text is well-written, the message clear, and the figures and figure captions are appropriate and well designed (except for some details which are listed below).

My concerns are only minor and essentially regarding some references that need framing and added discussions, as well as Figure 5 and interpretations thereof (see below).

Therefore, I definitely **recommend it for publication** and encourage the authors to pursuit it after some minor concerns have been addressed (listed below and in a noted *.pdf file).

MINOR CONCERNS:

1- The Introduction Section is well written and suited for the paper's results and discussions. Nonetheless, the issues related with IW propagation through a variable background (i.e. mesoscale variability via stratification and shear) have been discussed before in a few papers. Three papers are highlighted here which merit some additional framing and discussion in light of their previous results and the new (and valuable) insights provided by this paper.

- Nash et al. (2012) http://dx.doi.org/10.5670/oceanog.2012.44)
- Jeans and Sherwin (2001) https://doi.org/10.1016/S0278-4343(01)00026-7)
- Jensen et al. (2019) https://doi.org/10.1016/j.dsr2.2019.104710

2- Figs. 4c and 5d need some additional clarification. Stratification along the waves' typical propagation paths has two maxima between August and December. It may be misleading to assume that the IT energy is propagating in the same fashion as that of a waveguide with a single pycnocline (and any dynamics thereof). That does not hinder the results of the paper nor its conclusions, but it is better to clarify and discuss (very briefly!) that different dynamics are expected as reported in previous studie e.g. see the works by Theo Gerkema (https://doi.org/10.5194/npg-10-397-2003).

3- I think it may be very useful to have a visual illustration of the IT dynamics in this region – perhaps even highlight the distinct seasonal regimes. An example is attempted bellow for Oct. 13th 2015. There are other for the two contrasting seasons.

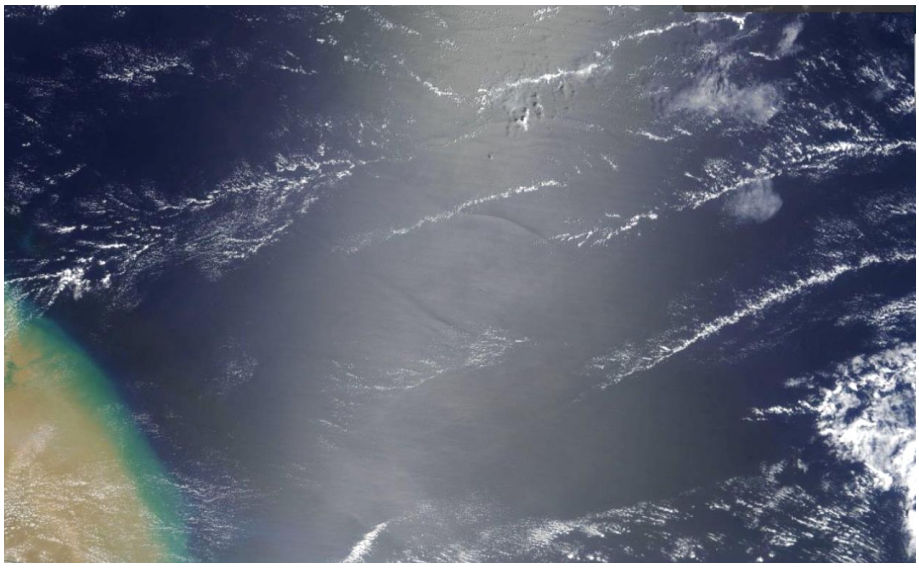

Fig. R1: example of IW packets propagation off the Amazon shelf highlighting the IT structure propagating below along the ocean's pycnocline: see https://odl.bzh/Ru88_65G.

Please see also the attached pdf. (Check yellow highlights for suggestions/corrections).