

Interactive comment on “Lateral transports of mass, inorganic nutrients and dissolved oxygen in the Cape Verde Frontal Zone in summer 2017” by Nadia Burgoa et al.

Anonymous Referee #1

Received and published: 11 December 2020

The manuscript presents a novel data set from a cruise encircling the Cape Verde frontal system. The field data is complemented with climatological and numerical data. The data is well represented so that the manuscript becomes a useful description of the hydrographic conditions in a region crossed by a complex frontal system. Standard calculations on water and property transports are also incorporated.

The above is fine but the data has potential for much more. In particular, I miss a more exhaustive analysis and discussion of the results. Some suggestions follow:

1) Can the imbalances be justified in terms of the evolving velocity fields? The authors could compare the numerical and field transports for the times each individual section

C1

was done (four sections, each carried out in about five days). They could also consider a mean numerical field during the entire period (25 days) and compare it with the combined realizations of the individual sections. Finally, they could use the numerical data to see if, at each time, the transports are balanced.

A different alternative would be to use the numerical data together with water-tracking software, such as available in <https://oceanparcels.org/>. That would allow the authors to differentiate between Eulerian and Lagrangian streamlines, as constructed with the numerical data.

2) The field data should be viewed as an opportunity to validate and identify the limitations of the numerical data. Possibly, numerical data does well near the surface but this may not be so at the subsurface where much less data is assimilated.

3) I would also suggest separating the region in two different domains, split by the frontal system. This would require first to set some criterion to define the position of the front, a criterion that may change with depth. Then the authors could check if properties are balanced for the tropical and subtropical domains.

4) Have the authors explored whether the imbalances in oxygen and inorganic nutrients are consistent? For example, if a deficit of oxygen is accompanied by a surplus of inorganic nutrients then the likely implication is remineralization. In my opinion, splitting the box in two regions would facilitate a joint interpretation of the imbalances in inorganic nutrients and oxygen.

5) Finally, I would recommend the authors to have the manuscript revised by a native English speaker. In particular, the manuscript is sometimes redundant and verbose. I also suggest to include fewer values throughout the text (tables already serve this purpose) and simply mention the most distinctive and peculiar features.

Some specific comments follow:

- I understand the convention of negative/positive values for water mass and water

C2

properties entering/leaving the domain but I would avoid saying that e.g. "-3.2 Sv entered through the north", simply say that "3.2 Sv entered through the north".

- page 4, line 1: I believe data is not gathered every 1 dbar, this is a result of the program that interpolates the gathered data.

- page 4: have the authors explored if there is Argo data available for the region at the time of their cruise?

- page 5: could you use the temperature XBT data, aided by T-S relations, to obtain an improved resolution of the salinity fields? Would it be possible to do something similar with the inorganic nutrients and dissolved oxygen fields?

- page 5: do not use lower-case t for the temperature, rather use capital T.

- page 10, line 23: I can see a MW signal only in one station; possibly a meddy in the northern section?

- Figure A1: indicate the bathymetric contours.

- Figures A9 and A10: include a curve with the net values.

- Figures A11 and A12: the figure caption is unclear: you have scattered plots of two different variables among NO₃, PO₄ and dissolved oxygen. The colour bar is simultaneous for depth and neutral density, which cannot be right; it may be an approximate colour bar but you need to indicate so.

- Figure A14 and tables A1, A2: I suggest you show the transports as separated by the frontal system.

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2020-98>, 2020.