

Interactive comment on “Intermediate water flows in the South West Pacific from OUTPACE and THOT Argo floats” by Simon Barbot et al.

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Response to : Anonymous Referee #2

This paper explores aspects of intermediate water flows in the southwest and central Pacific using individual Argo floats. From an analysis of low oxygen intrusions in a float flowing within the NCJ the authors argue that they originate from the NVJ–advected

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by cyclonic eddies. The variable oscillatory trajectories of zonally propagating floats are examined in detail. The Lagrangian and Eulerian characteristics are determined. Their analysis shows that a single Rossby wave can explain the trajectories of 2 floats travelling in opposite directions. A further section considers the salinity and density structure at 1000m (the Argo parking depth) and the impact on the float trajectories.

I find that the paper lacks any overall focus. It comes across as a few mildly interesting but unconnected observations. They all involve aspects of the circulation in the region but ultimately do not make a coherent story. The content is simply not strong enough to be suitable for publication.

Our manuscript contains two parts that have been found interesting by specialists of the Coral sea concerning the first part, and more generally by physical oceanographers concerning the wave impact at intermediate depth deduced from Argo trajectory for the second one. Moreover, they both have repercussions on biogeochemistry that are of interest to a more expanded community, and in particular to the OUTPACE community; hence the submission as one paper in this Special Issue. Another reason for gathering them in one manuscript is that both studies derive from focusing on float trajectories taken on individual basis; point that we propose to stress with the new title (see below).

Further Comments

The title is very specialized. How many readers would know the meaning of the OUTPACE and THOT acronyms? [Another proposition is: "Intermediate water flows in the South West Pacific : contribution from individual Argo floats"](#)

Page 1, Line 16 - ...(WTSP) interests is of interest to the biogeochemical ... [Done](#)

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Page 2, line 18 – Change to 'BGC data from the float allow us to determine whether it has encountered water masses coming from the NVJ. Done

2, line 35 - ...during the OUTPACE cruise or in the framework of the THOT project. Why are you canceling the signification of the THOT acronym and the reference to THOT ? "(TaHitian Ocean Time series, Martinez et al. 2015)"

4, line 1 – we also replace place the float trajectories Done here and everywhere else in the article.

4, line 10 - For memory, it begins with the descent of the float The float descends to a depth around 1000m, called ... We have modified the sentence accordingly : "This cycle starts with the descent of the float to a depth around 1000 m, called..."

4, line 25 – An error estimate should be provided. We have added the Table:

Table 1. Statistics for the different floats between surface and deep trajectories, the results are presented as 'mean \pm std'.

Float	Type	Surface distance [km]	Deep distance [km]	Surface speed [cm/s]	Deep speed [cm/s]
656	PROVBIO	0.44 \pm 0.23	17.32 \pm 18.18	29.57 \pm 15.83	4.30 \pm 3.93
660	PROVBIO	0.35 \pm 0.18	15.96 \pm 9.28	25.77 \pm 13.16	3.65 \pm 1.87
671	ARVOR	6.08 \pm 3.44	25.30 \pm 14.04	28.37 \pm 16.12	3.00 \pm 1.67
679	ARVOR	4.84 \pm 2.38	21.88 \pm 12.17	22.44 \pm 11.07	2.60 \pm 1.45
687	PROVBIO	0.33 \pm 0.19	8.54 \pm 6.53	24.26 \pm 13.20	3.66 \pm 1.89

To satisfy both you and the other reviewer, we have also replaced the sentence "After some verifications...deep displacement." by the paragraph :

"Table 1 shows the mean properties of each studied float. First, it highlights the differences in surface distances between PROVBIO and ARVOR floats. At the surface, ARVOR floats drift over a distance about 10 times greater than PROVBIO floats. This

is due to the longer time they spent at the surface (6h for ARVOR floats and 24min for PROVBIO one). The ratio between deep and surface distances is a factor of 30 for PROVBIO floats and still 4 for ARVOR ones. Float 656 exhibits anomalously high standard deviation for its deep distance and deep speed. These high values, equal to the mean ones, are due to the period during which the float was grounded on the sea floor in the Queensland plateau. Otherwise we have concluded that surface displacements can be neglected compared to deep displacements without doubt for PROVBIO floats and with caution for ARVOR floats. Hence, when needed in the wave section, we will only use the former ones and consider that the trajectory dynamics are mainly due to deep circulation processes. The discussion of such considerations is thoroughly made by Ollitruault and Rannou (2013)."

5, line 3 – Trajectory description for the a wave approach We have changed it to :
"Wave characteristics from float trajectory"

5, line 4 – What type of waves? We have modified the first sentence of this section to make it more explicit: "Here the objective is to find the characteristics of a single wave that could explain the float trajectories which represent both retrograde and prograde circulation (retrograde when Lagrangian motion is in the opposite direction as the wave propagation; prograde when Lagrangian motion and wave propagation are in the same direction; as defined in Flierl, 1981)".

11, line 14 – we could hypothesized hypothesize that such ... Done

15, line 2 - ...we are able to replace place the trajectory... Done

15, line 6 – This appears to be stating the very obvious point about the two different velocity observations. Sentence removed

18, 4 - ..and then be transported southwards thanks to by the current located... Done

18, line 7 - ..widen the comprehension understanding of the connection ... Done

18, line 7 – and the NCJ and claim for the suggest that there be an explicit consideration

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of mesoscale eddies eddy variability in future modeling approach approaches. [Done](#)

20, line 8 – To replace place the [Done](#)

20, line 13 – of water masses properties, [Done](#)

20, line 16 – form a favorable context environment... [Done](#)

20, line 16 – Not sure what you mean by the sentence beginning 'Correcting the impact of the Lagrangian observation [We have changed the sentence "Correcting the impact...zonal directions."](#) by :

["In order to convert Lagrangian wave observations into Eulerian ones in a simplified case, we concentrated on two floats, heading in opposite zonal directions, and hence providing both cases of prograde and retrograde motions."](#)

20, line 20 – would require to wait until the time series are longer a longer time series. [Done](#)

A large portion of the paper (1/3) deals with the methods and description of decomposing the float trajectory into a wave framework. A briefer description of the method would be more appropriate for the paper. [We agree that the method section is a bit large but, since this article is proposed for publication in the OUTPACE Special Issue mainly composed of biogeochemistry articles, we made the choice to start the explanation of the methods with a very generic/basic framework, accessible to all oceanographers and not only physical oceanographers.](#)

The figure generally are poor, the captions are tiny and difficult to read. Figure 9 is simply impossible to distinguish any of the contours. To summarize the figures are below the standard required for publication. Any submission for review should provide figures that are ready for publication., all the figure were reprocess to get a decent resolution [Done. We have reprocessed all the figures and set them with an adequate resolution to avoid any inconvenient or misreading. The revised version can be transmitted as soon as requested.](#)

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