

## ***Interactive comment on “Impact of mesoscale eddies on water mass and oxygen distribution in the eastern tropical South Pacific” by Rena Czeschel et al.***

### **Anonymous Referee #1**

Received and published: 5 February 2018

Review of Manuscript: " Impact of mesoscale eddies on water mass and oxygen distribution in the eastern tropical South Pacific" by Rena Czeschel et al.

This paper used multiple-platform observations to investigate different types of mesoscale eddies in the eastern tropical South Pacific region. The transports and life-cycle evolution of the observed eddies is the main point of this paper, which provide with a lot of valuable information of the eddies within this region. The results of this paper is abundant and interesting, if the authors can put the observational results into a more consistent story, the significance of this paper will be improved substantially. Some further clarification and discussion are also needed. I recommend considering

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publication after major revision, and I will leave my questions in the Specific Comments.  
Specific Comments:

1. Page2 Line3-5: It is a little confusing to say the “isolation” and “mixing” of the water mass at the same time. If the mixing reaches maximum, the water mass is no longer strictly isolated. Maybe the reader can understand the meaning of authors after finishing the whole paper, as the presentation here within the abstract, the author could give a clarified presentation. 2. Page5 Line 14-17: A sketch of the mooring and the equipment/probes on it will help readers to imagine how the mooring operates. 3. Page7 Line 5-9: The figure of the trajectory of the Argo floats should be given, which will directly demonstrate how the floats being trapped and moving with the eddy. 4. Page8 Line 1-6: The high-frequency observation of mesoscale eddies by mooring is quite valuable. With the altimeter data providing the eddies’ location and radius, the mooring observations can be projected onto eddy center coordinate and reconstruct the three-dimensional structure of the mesoscale eddies (Similar to Fig.4), which may give a lot of useful information of the eddies. 5. Page12 Line14-17: There are two types of transports that can be done by eddies: stirring and trapping. The stirring transport happens when there is a background tracer gradient, with the swirling velocity of eddies, the down-gradient transport of tracer will emerge. The stirring transport does NOT need the eddy to move. On the other hand, when an eddy traps a water mass within its core area, the tracer within this water mass will be transported. The net flux of this kind of trapped-transport happens when the eddy is moving and the trapped water mass having different properties contrasted with surrounding environment. The main focus of the authors is the second kind of transportation. This should be clarified. And with the measurements of the mooring, the first kind of stirring transport can also be evaluated quantitatively. 6. Page18 Line 1-5: From Fig.5c, significant variation of the nonlinear parameter  $U/c$  can be observed. At the same time, the nonlinear parameter  $U/c$  is also used by the authors to compute the vertical extent of the trapped fluid by the eddy. This means the volume of the trapped water by the eddy will also

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experience significant variation. But the trapped water mass is expected to be quite coherent and isolated, what will cause significant variation of its volume. The authors should give further clarification and discussion. 7. Page 22 Line6-8: The lateral mixing between eddy-core and surrounding water is related to the evolution of eddy, especially its decaying processes. Could the lateral mixing derived from the Argo floats be used to explain the variation of eddy amplitude observed by altimeter?

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Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-5>, 2018.