

Ocean Sci. Discuss., referee comment RC1  
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## Comment on os-2021-31

Anonymous Referee #1

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Referee comment on "Contribution of buoyancy fluxes to tropical Pacific sea level variability" by Patrick Wagner et al., Ocean Sci. Discuss.,  
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The experiments and results conducted by the authors to estimate the effect of buoyance fluxes on the tropical Pacific sea level were interesting and well supported the conclusions of the claims. However, it is necessary to explain some terminologies and experiments further and use a more quantified language to interpret the experimental results.

### Major comments

1. There is not enough description of the buoyancy flux in the title. Readers without prior knowledge cannot understand at all. It is necessary to introduce what buoyancy flux means.
2. The results of O025-W90 and O025-B90 represent momentum and buoyancy flux effects, respectively. However, there is too little explanation for each of these cases. Authors need to explain to both models so that readers can get a rough understanding of what each of these results means without reading the bibliography.
3. There are more strong ENSO events 1982/83, 2015/16. If the authors provide one more analysis, the authors will be able to convey the claims more clearly. There is a limit to reaching generalized conclusions through a single case study.
4. Figures 6, 7, and 8 are very important. However, it is confusing because the pictures are not properly marked. Add lines and boxes to make the pictures easier to read.
5. I generally understand and agree with the authors' claims. By the way, the language used for comparison is not clear (especially section 3 results). It is necessary to quantify the comparison, and if it is difficult to quantify, please provide more details in what respects they are similar or dissimilar, or triggered.

### Minor comments

- L21: Add a description of "Ocean atmosphere buoyancy fluxes." before using this term.  
L24: Define SLC before using.  
L76: Is the meridional dipole right what the authors are trying to explain? It seems to be explaining the zonal dipole. If the authors try to explain the meridional dipole, please make it more clear.  
L84: "In all cases, the correlation coefficient is over 0.95", but in the case of "3", 0.95 is unreasonable. Please check it.  
L91: it is helpful to show SPCZ on the map.

L97-98: A bibliography is needed.

L115-116: "Changes are mainly limited... in O025-W90." It is difficult to agree with the argument by judging by the colors only.

L133-137: It is difficult to accept the argument from a comparison of two temporal windows only. It is recommended to make a moving calculation window and show the change of SD.

L139-141: Please provide a visual comparison with the ENSO index (simply just add up any ENSO relating indices). There is a limit to generalizing to only one event.

L167-168: "These anomalies... . (Fig. 7b)." I don't understand. An additional explanation is required.

Figure 1: "SD" needs to be predefined before use.