

Interactive comment on “Linking diverse nutrient patterns to different water masses within anticyclonic eddies in the upwelling system off Peru” by Yonss Saranga José et al.

Anonymous Referee #1

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General Comments

This paper shows results from a coupled physical and biogeochemical ocean numerical simulation. The authors identified two anticyclonic eddies off Peru in the simulation and showed that the local biogeochemical processes in the model can not explain the temporal variations in nitrate concentration within eddies. Although the authors found that local biogeochemical processes are less important than advective processes, the analyses presented by the authors were mostly focused on the role of biogeochemical processes, with some hydrographic investigations to track the origin of the advected water. Because the authors found that advective processes are important, then the advective fluxes should be analyzed directly, as they are available from the numerical

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results. Another effective tools to track the origin of the watermass would be particle tracking. Without these analyses, the paper seems to lack the supporting evidences to derive the conclusions that nutrient injected into and out of the eddies by advection are playing important roles in time variations of nutrients within the eddies.

Specific Comments P1 L16 "...to enhance near-surface vertical transport and thus increase the ...". For this sentence, references should include submesoscale papers e.g. Levy et al, Mahadevan and Archer 2000.

P1 L24 "Eastern Tropical Pacific (ETSP)" Should be "Eastern Tropical South Pacific"

P3 L28 "Fig. 2-c" Should be "Fig. 3c".

P3 L29 "Fig. 3-f" Should be "Fig. 3-c".

P4 L17 "... apparently indicative of on-going denitrification within the structure, ...". As the authors have numerical results for denitrification shown in Fig. 6, these numerical indications should be mentioned here as well.

P4 L21 "... with weaker strength of the westward component ...". Why westward components are weaker? Is this result consistent with the observations?

P4 L30 "show" should be "shows"

P5 L1 "Minimum velocities" Isn't it "Maximum velocity magnitudes"? Why westward components are subsurface? Is this result consistent with the observations?

P5 L9 "Asim,," Remove one of ",".

P5 L13 "Figure 7 shows the time ...". The authors should explain how the each biogeochemical term, and nutrient concentration within the eddies are computed here.

P6 L25 "These water match those from ...". The authors should show if eddies often propagate northward in this region, and how PV distribute on average.

In 3.2 The authors compared the source and sink of nitrate and nitrite with the concen-

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trations of these tracers within the eddies in Fig. 7 and 9. But cumulative production and reduction are straight lines, which means that only one rate for production and reduction at some point is used to evaluate the source and sink contributions. Is the result same if time evolutions of sink and source are taken into account? Also when the authors compute each terms within the eddies, does the averaging domain vary as the eddy evolves?

The authors should conduct more comprehensive investigations to track the origin of the water inside the eddies, by computing advective transport both along vertical and horizontal directions, and diffusive transport by parameterized turbulent diffusion. The Lagrangian particle tracking is also another effective method for this.

Also, in this paper, only two eddies are analyzed. Are these presented biogeochemical features within the eddies are representative for most of the eddies? Are cyclonic eddies not important?

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