

Interactive comment on “Vertical segregation among pathways mediating nitrogen-loss (N₂ and N₂O production) across the oxygen gradient in a coastal upwelling ecosystem” by Alexander Galán et al.

Anonymous Referee #1

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The manuscript “Vertical segregation among pathways mediating nitrogen-loss (N₂ and N₂O production) across the oxygen gradient in a coastal upwelling ecosystem” from Galan et al. presents measurements of production rates of different nitrogen cycle processes from a station off Northern Chile along with hydrographic and stable isotope data, measured at different times during the upwelling season.

The suite of experiments conducted gives a comprehensive insight into the N cycling processes and their relative contributions to the N budget, particularly due to the combination of different ¹⁵N tracer incubations with inhibitor experiments. The manuscript

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is generally well written and well-structured and includes a profound discussion of the processes investigated during the study, and I find the manuscript generally worth publishing.

However, I have some difficulties with the conclusion drawn by the authors that the temporal differences observed between the two sampling dates are mainly driven by short-term variations in the wind field and subsequent particle export that superimpose the seasonal signature of upwelling. The data shown by the authors do not fully support this hypothesis, though: as pointed out by the authors, sampling was carried out at the beginning and in the middle of the upwelling season. The observed difference in oxygen concentration, particle distribution and nitrogen cycling could also be attributed to the signals of intensified remineralization as a consequence of the progressing upwelling season. A clear indication that the particle distribution and thus the nitrogen cycling is directly linked to short-term variations in the wind field is missing. Further information (e.g. showing time-series data of chlorophyll and particle distribution along with the analysis of the wind field) should be provided to support this hypothesis.

Specific comments:

P 5, L 16: Please provide a reference for the particle size and abundance measurements.

P 5, L 26: please provide a reference for the method used for N₂O measurements. What is the relative uncertainty for these measurements?

P 8, L 12: replace “hydrographic variability” with “hydrographic conditions”

P 11, L 31-34: please further explain how the particle distribution is governed by wind-induced upwelling (see my comment above).

P 13, L23: ...can be mostly accounted for by...

P 13, L 21-36: are there other data on the organic matter distribution (e.g measurements of POM or DOM) available to directly assess the OM availability during the sam-

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plings or can the OM availability estimated from the particle distribution?

P 15, L 8-10: please cite also Löscher et al. (2012) for an increased N₂O production from archaeal nitrification.

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