

Biogeosciences Discuss., referee comment RC3
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Comment on bg-2021-174

Anonymous Referee #3

Referee comment on "Dimethylated sulfur compounds in the Peruvian upwelling system"
by Yanan Zhao et al., Biogeosciences Discuss.,
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The manuscript investigated the variations of dimethylsulfide (DMS), dimethylsulfoniopropionate (DMSP), and dimethyl sulfoxide (DMSO) in the Peruvian upwelling system. This study will help us understand better the biogeochemical cycling of dimethylated sulfur compounds in the upwelling regions off Peru. The authors' study indicated that nutrient availability appeared to be the main driver of the observed variability in the surface DMS distributions in the coastal areas. However, there are some conclusions drawn that might need further discussion and revision. I would like to provide the detailed comments below.

Line 17-18 Why did not the authors take samples of DMSP and DMSO in October 2015?

Line 158-160 "The N:P ratio, defined as the ratio of the sum of nitrate (NO_3^-) and nitrite (NO_2^-) to dissolved phosphate (PO_4^{3-}) for both cruises, is a good indicator of nutritional status: high/low N:P ratios indicate nitrogen repletion/limitation." Why didn't authors consider ammonium (NH_4^+) which was also an important dissolved inorganic nitrogen? Would it make a significant effect on the conclusions if considering the concentration of NH_4^+ ?

Line 167-168 "with the most abundant phytoplankton groups being diatoms (45 %), haptophytes (24 %), and chlorophytes (18 %) (2018)". "(2018)" here needs a reference.

Line 168-169 "N:P ratios were generally between 8–13 in the Peru upwelling region during SO243, indicating slightly limiting nitrogen conditions." How to define the nitrogen repletion/limitation, what's the N:P ratio range?

Line 202-203 "In contrast to our observations, Zindler et al. (2012) reported a general decreasing trend of DMSP concentrations with decreasing N:P ratios (1–12). This may be because the response to nitrogen limitation differs among specific algae groups." What are the dominant algal groups in Zinder et al.'s (2012) study?

Line 205-207 "variability at the species or genus level might result in different responses under nitrogen limitation." Here a reference is needed.

Line 227-228 "Generally, both N:P ratios and Ndef significantly correlated with coastal

DMS values in the surface waters". Did the DMS values and the concentrations of solo nutrients exhibit any relationship?

Line 255-256 "A comparison with DMS data from other EBUS and the Arabian Sea illustrates that DMS concentrations off Peru (up to 44 nmol L⁻¹) are higher". Why did not the authors discuss the difference in DMS between Peru 1982 and this study? The DMS concentrations in this study were significantly lower.

Line 279 "which might be a result of the discrepancy for DMS flux densities between the two cruises". The explanation was out of place. Don't put the cart before the horse. The discrepancy for DMS flux densities was influenced by the DMS concentrations in seawater and atmosphere and wind speeds. Therefore, the difference in the DMS concentration in the atmosphere could not be attributed to the discrepancy for DMS flux densities. Please explain it reasonably.

Line 289-290 "On average, the mean DMS flux densities in the first and third regions during SO243 are slightly higher/comparable to 5.5 μmol m⁻² d⁻¹ reported from Marandino et al. (2009)" Where did the first and third regions represent? Please define them.

Line 342-Line 343 and Line 358-360. Please check the references carefully.