

We thank Referee 3 for the detailed comments and have refined the manuscript as suggested.

General comments:

R1: Line 17-18 Why did not the authors take samples of DMSP and DMSO in October 2015?

Authors: We collected DMSP_t and DMSO_t samples in October 2015. However, the subsequent measurements showed unreliable results and, therefore, we decided to exclude these results from the discussion.

R2: Line 158-160 "The N:P ratio, defined as the ratio of the sum of nitrate (NO₃⁻) and nitrite (NO₂⁻) to dissolved phosphate (PO₄³⁻) 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 (NH₄⁺) which was also an important dissolved inorganic nitrogen? Would it make a significant effect on the conclusions if considering the concentration of NH₄⁺?

Authors: Unfortunately, no NH₄⁺ measurements were made during both cruises. The autoanalyzer used during M91 and SO243 had no NH₄⁺ channel, and because of the well-known contamination problems, we decided not to apply the manual method for NH₄⁺ measurements. In fact, the N:P ratios won't change much when including NH₄⁺ because NH₄⁺ are usually very low in the oxic surface layer. Additionally, there is no reference reporting the effect of NH₄⁺ on the DMS.

R3: Line 167-168 "with the most abundant phytoplankton groups being diatoms (45 %), haptophytes (24 %), and chlorophytes (18 %) (2018)". "(2018)" here needs a reference.

Authors: Done.

R4: 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?

Authors: We thank the referee for this question. We used the constant 12.6, which is the empirically determined N:P ratio of organic matter produced in productive waters, as the threshold for nitrogen repletion/limitation (Codispoti and Packard, 1980). We added this information to the manuscript.

R5: Line 202-203 "In contrast to our observations, Zindler et al. (2012) reported a general decreasing trend of DMSP_t 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?

Authors: The dominant algal group were diatoms in Zinder et al.'s (2012) study and we added this information to the text.

R6: Line 205-207 "variability at the species or genus level might result in different responses under

nitrogen limitation." Here a reference is needed.

Authors: Done.

R7: 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?

Authors: We thank the referee for this question. Only coastal DMS values from M91 negatively correlated with NO_3^- ($r^2 = 0.34$, $p < 0.01$), while this is still lower than the correlation between DMS and N:P ratios ($r^2 = 0.50$ $p < 0.01$) during M91. Coastal DMS did not exhibit a relationship with any solo nutrients during SO243 (NO_3^- , NO_2^- and PO_4^{3-}), and this is also the case when combining the two cruises together. Therefore, we believe that N:P ratios or Ndef provided additional information for the relationship between the nutrient availability and DMS in the Peru upwelling.

R8: 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.

Authors: The comparison between Peru 1982 and this study was originally described in lines 236-242 in the manuscript. Now we have readjusted the order of the corresponding text in order to make it more logical (241-248).

R9: 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.

Authors: The referee is right. We have rephrased the statement.

R10: 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 $\mu\text{mol m}^{-2} \text{d}^{-1}$ reported from Marandino et al. (2009)" Where did the first and third regions represent? Please define them.

Authors: We have rephrased the statement in the manuscript.

R11: Line 342-Line 343 and Line 358-360. Please check the references carefully.

Authors: Corrected.