

## ***Interactive comment on “High production of nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and dimethylsulphoniopropionate (DMSP) in a massive marine phytoplankton culture” by L. Florez-Leiva et al.***

**Anonymous Referee #2**

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This paper describes interesting measurements of CH<sub>4</sub>, N<sub>2</sub>O and DMSP during a phytoplankton culture and found high production of trace gases, especially N<sub>2</sub>O. However, some points have to be clarified and discussed in more detail. 1. Page 6708, Section 2.1: Authors should give more details on the mesocosm and sampling strategy. For example, when were the samples collected at each day? Was all water samples were collected at the same time of each sampling day? Where were the samples collected in the pond and was the samples representative of the whole pond? The samples were collected from which water depth? Was there any sediment in the mesocosm? The

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exact composition of the nutrient fertilizer should be given. 2. Table 2: As we know, the solubility of gases in water is low and dissolved gases in surface waters are easily exchanged to the atmosphere. As the author mentioned, the water in the pond is recirculated and well mixed during the whole study period, then I wonder if the determined variation of trace gases can reflect the real production/consumption in water column? 3. Fig. 2: Plots of expected equilibrium concentrations of trace gases at the ambient S and T values should be given in the figure. It would be helpful for the reader to judge the potential variation of trace gases due to in situ production/consumption. 4. During the incubation, N<sub>2</sub>O increased obviously during the first 30 days and then decrease. What's the contribution of nitrification and/or denitrification to the production and consumption of N<sub>2</sub>O during this period? More details about the variation of ammonium, nitrate and nitrite in the water column should be added to help learn the bacterial processes involved in nitrogen transformation in the pond. 5. The variation trend of CH<sub>4</sub>, N<sub>2</sub>O and DMSP were different with each other, the authors should explain more about the difference. 6. Air-water fluxes: Data on wind speeds are currently lacking, please give details of the used wind speeds. This is important for the calculation of the air-sea fluxes because they heavily depend on the applied wind speeds. 7. Total suspended matter in the pond should be given since they may be related to the production of CH<sub>4</sub> and N<sub>2</sub>O. 8. The lost DMSP during an algae bloom was previously found to be converted to methane (Damm et al., Mar. Chem., 2008). Is there any correlation between DMSP and CH<sub>4</sub> in this study?

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