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Interactive comment on “Differential response of planktonic primary, bacterial, and dimethylsulfide production rates to vertically-moving and static incubations in upper mixed-layer summer sea waters” by M. Galí et al.

Anonymous Referee #2

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Section 1. General comments

This study aims at estimating how dynamic light exposure affects phytoplankton and bacterioplankton physiology, as well as DMS production compared to static light conditions (which are generally used). They mainly conclude that dynamic light significantly affects the responses of bacterioplankton, and does not significantly affect primary production nor gross DMS production, compared to static light conditions. They also discuss the link between UV exposure and DMS(P) concentrations. The manuscript is well written, well structured, and informative. I have only a few suggestions/questions

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before recommending it for publication. In particular, I feel that the part on the DMS(P) cycling could be discussed more in detail.

Section 2. Detailed comments

Abstract

Somewhere in the abstract it should be indicated that this study deals with short-term effects. This should also be reminded when needed in the text (e.g., when comparing with results from the literature).

Introduction p. 8855, l. 9-11: A review of the effects of UV irradiation on DMS(P) (in situ and in cultures, e.g., Hefu and Kirst 1997, van Rijssel and Buma 2002, Sunda et al. 2002, Slezak and Herndl 2003, Harada et al. 2009, Archer et al. 2010) could be included here, to emphasize this part of the discussion later on.

Material and Methods

p. 8858, l. 17: What does the value of 2.303 represent in this equation?

p. 8858, l. 26-29: FSC, which is largely determined by the cell's size and shape, should be used to evaluate the cell size instead of SSC, which depends on internal and external structure and refractive index (Collier, 2000).

Results and Discussion

p. 8860, "Oceanographic settings": It would be interesting to display the concentrations of the major nutrients, and to discuss their potential role in influencing the high DMSP:Chl a ratios (besides the presence of strong DMSP producers). Higher irradiance (and UV penetration) at the open ocean stations could also explain the higher DMSP:Chl a ratios compared to the coastal stations.

p. 8862, l. 6-9: The comparison to the study by Sommaruga et al. (2005) is not clear. What did these authors show?

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p. 8863, l. 15-22: Given that the $Dt:(Dd+Dt)$ index can vary within a few minutes (as pointed out by the authors), it can not be used with confidence and I suggest to delete this paragraph.

p. 8866, "Response of gross DMS production": That part of the discussion would benefit from a more detailed review of the literature, with comparisons of your results with previous results dealing with phytoplankton and UV exposure (in situ and in cultures, e.g., Hefu and Kirst 1997, van Rijssel and Buma 2002, Sunda et al. 2002, Slezak and Herndl 2003, Harada et al. 2009, Archer et al. 2010).

p. 8867, l. 15-18: I don't understand this assertion. Please clarify. Also remind the reader that this assumption may be valid only for short-term exposure.

p. 8867, l. 24-25: "higher amounts of DMSP were lost as DMS (and perhaps as DMSP) at higher irradiance." Did you mean "higher amounts of DMSP were lost as DMS (and perhaps as DMSO)"?

p. 8868, l. 2-8: It seems contradictory to me that DMSP could be cleaved into DMS by "OH radicals, without the need of DMSP cleavage enzymes", and that "intracellular DMSP pool escapes as DMS without reacting with intracellular oxidants". If DMSP is cleaved by reaction with OH radicals, then DMSP reacts with intracellular oxidants. As far as I remember from D.J. Kieber's presentation at the 2011 ASLO meeting ("Direct DMS and DMSO production from DMSP reactions with reactive oxygen species"), DMSP could indeed be cleaved directly into DMS and DMSO, and the produced DMS could itself be oxidized into DMSO. The presence of the DMSO reductase in phytoplankton could further increase the antioxidant capacity of the DMS/P/O system by fueling a coupled DMS/DMSO antioxidant cycle. Please clarify this part.

Section 3. Technical corrections

p. 8858, l. 17: "where $A_{\text{filter}}(\lambda)$ is the measured absorbance".

p. 8860, l. 10: "The sampled upper mixed layer (UML) was in all cases"...

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p. 8860, l. 20; p. 8867, l. 25; and Table 1: DMSPt has not been defined.

p. 8881, Fig. 3: The legend of the X-axis is missing.

END OF REVIEW

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