Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2019-166-AC1, 2020

Open Access Earth System Science Data Discussions

Interactive comment on "Reanalysis of vertical mixing in mesocosm experiments: PeECE III and KOSMOS 2013" *by* Sabine Mathesius et al.

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Received and published: 11 April 2020

We thank the reviewer for her/his constructive comments on our manuscript. We revised our manuscript accordingly. The detailed responses are given below, where R indicates the Referee Comment and A indicates the Author Response.

R: The vertical mixing drives phytoplankton up and down the water column, which affects phytoplankton-experienced light intensity and quality, thus the photophysiology, and ultimately influences marine primary productivity. I think as background the effects of vertical mixing on phytoplankton should be mentioned in the Introduction part as well as the future perspective in the end.

A: We thank the reviewer for this suggestion and added the following sentence to the

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Introduction: “By distributing phytoplankton to different depths, vertical mixing also influences the light-exposure and consequently light-sensitive physiological processes of the phytoplankton, such as photo-acclimation, which has an effect on primary production.” Furthermore, we now also mention this aspect in the last paragraph of the manuscript: “Including both vertical mixing and biogeochemistry in future mesocosm model studies could lead to a deeper understanding of biogeochemical processes in the pelagic, e.g., changes in carbon export due to ocean acidification as well as changes in primary production due to varying light-exposure and nutrient availability."

R: If I understand properly, the mean temperature was obtained from all measured values (from surface to bottom, and from start to the end of the experiment). However, according to the first panel of Figure 4 the mean temperature should be close to the medium value of 10°C.

A: It is correct that we calculate the mean temperature of each mesocosm by using all data points in time and space. The mean observed temperature in this case (KOSMOS 2013, mesocosm #10) is 7.38°C as stated in Table 4, which is consistent with the observed temperature values depicted in Figure 4.

R: Averaging the temperature throughout the experiment period missed majority of information when comparing observed and simulated values as described in the text (Page 11 Line 33-35). So, I suggest comparing them day by day, in a temporal scale.

A: We agree that much information is lost when discussing only the average values, which is why we thoroughly discussed the temporal differences in simulated and observed temperatures in the Results and Discussion sections (also illustrated in Figs. 2 and 4). We originally considered the introduction of additional figures that compare the differences on a daily basis. However, we realised that these graphics would only provide another perspective, without actually providing new information. We therefore decided to omit these figures.

R: Format the references: Some titles of listed articles are capitalized each word (Page

9, Lines 3, 23 and 31; Page 20, Lines 9 and 14, and Page 21, Line 13), and the remaining ones just capitalized the first word. Page 21 Line 18, remove the dot.

A: We are grateful for this comment and have revised the references accordingly.

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