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Biogeosciences Discussions

Interactive comment on "Effect of light on photosynthetic efficiency of sequestered chloroplasts in intertidal benthic foraminifera (*Haynesina germanica* and *Ammonia tepida*)" *by* Thierry Jauffrais et al.

Anonymous Referee #1

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The manuscript reported about the effect of different light intensities on chlorophyll concentrations, photosynthetic capabilities, and oxygen production/consumption rates during 7 days incubation experiments. They found that chlorophyll concentrations and photosynthetic capabilities differ with light intensity, even between low level of light intensities. The authors also reported that A. tepida did not show such long retaining of chloroplast, suggesting H. germanica should have some way to keep chloroplast, not just digesting them. Some of the findings are new (and the method they used is probably new for foraminiferal kleptoplasty study), but the present manuscript should be re-organized before its publication.

Introduction In the introduction, the authors need to specify (or concentrate) more on precise objective of the authors study: i.e. what is known about the light intensity effects on kleptoplasty (only dark and light comparison before?), and why the authors need to clarify light intensity effects, not a function of chloroplast etc.

Discussion 4.2. Most of this section, in particular 2nd and 3rd paragraphs, the discussions are stretchs from the current manuscript. I am sure that the ecological role of kleptoplasty is very important topic and the authors' future goal would be this scope, however, the current manuscript reported about the effect of light intensity on the chlorophyll intensity (chloroplast abundances) and its photosynthetic efficiency. If the authors want to keep these discussions, they must discuss by incorporating their findings in this manuscript. I rather suggest to discuss about the meaning of the authors findings that the chlorophyll retention times and photosynthetic capabilities differ greatly between LL and HL, "although HL is still far below the natural photon radiation levels".

Other minor comments or corrections

Page 2 Line 12 If the authors mention "secondary role" here, then the authors need to mention about that bacteria play primary roles on carbon cycling in aerobic sediments.

Line 16 The sentence starting with "Some benthic foraminifera. . ." seems appeared abruptly. Is kleptoplasty related to carbon cycling or anoxic adaptation of the foraminifera? If so, please add relevant connections from the former sentences.

Page 3 Line 13 Costal > coastal

Page 4 Line 21 What is the "-" before 2.019W? Does this mean 2.019E?

Line 23 ∼20 kg

Line 27 Please note the filter size

Page 5 Line 11 Please explain shortly about the methods described in Jesus et al.

(2008).

Line 12 50 specimens of H. germanica and . . .

Line 25 This is the first place appearing RLC, so please explain.

3 X 10 specimens (or individuals)

Page 6 Line 11 How long did the authors wait till the oxygen microprofiling after putting foraminifera into the tube?

Line 19 Which position of oxygen gradients were used to calculate diffusion flux? Near foraminifera? Maximum slope? Or did authors proximate in some way? Please specify and describe.

Page 7 Line 20 I guess Ammonia tepida exhibited chlorophyll at the start of the experiment because they still have some diatoms in food vacuoles. It may be interesting to compare the concentration of chloroplast at the begging (perhaps reflecting selective ingestion?) or reduction of chlorophyll in A. tepida as an index of degradation of chloroplast and that of H. germanica, which retain chloroplast.

Line 25 Please note wave length

Page 8 Line 5 Triplicate measurement for each specimen? or just using 3 specimens as triplicate? Please specify.

Line 9 Again, individuals or specimens are better than using “foraminifera”

Line 12 To compare the foraminifera test mean maximal elongation “between what”

Line 23 “390 +- 42 um (SD, n = 34)” is better

Line 29 Absorption at 435 and 585 nm are not “deep absorption feature”.

Page 9 Line 1 In the figure 1, there is no indication of Chla at 435 nm wavelength.

Line 3 Please note which sample (starved and kept dark under 7 days?) was used for

this spectral signatures in Figure 1.

Line 12 There is no statistical indication in Figure 3. Also, Kruskal Wallis can detect differences between several samples, but cannot say anything about the difference between specific two samples. Therefore, if the authors describe “Samples kept in the dark did not show an obvious decrease”, then the authors need to perform another statistical analysis on this.

Regarding figure 3, did the authors perform any kind of “calibration” between pixel values and chlorophyll concentration? If not, the vertical axis (pixel values) does not have any numerical meaning. I therefore suggest to present as relative chlorophyll fluorescence as T0=100%.

Line 21 No evidence of photoinhibition “of this measured range” or something

Line 30 “light respiration being lower than dark respiration” Based on the Table 1, LL respiration was higher than dark respiration. Does “light respiration” mean the average of LL and HL? Please specify.

Page 10 Line 2 LSD test “)”.

Line 26 Clearly show “that”?

Page 11 Line 8 “24” umol photons?

Line 11 Do the authors have any idea on the in situ light intensity?

Page 12 Line 7 It seems the authors want to say “modestly” or something instead “little”

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