

**Authors' response:**

All requested changes were made to the manuscript text document. Thank you for the corrections. Point by point responses are below in italics.

Sincerely,

Mak Saito

**Associate Editor Decision: Publish subject to technical corrections (26 Jul 2018) by Christine Klaas**

Comments to the Author:

Dear Authors,

I am pleased to accept your manuscript for publication in Biogeosciences. Below please find an additional few minor comments for the final version of the manuscript.

Sincerely,

Christine Klaas

Lines 101-103: "Recent in vitro iron addition experiments provide evidence that iron nutrition influences *P. antarctica* growth in this region, with increasing *P. antarctica* biomass after iron addition (Bertrand et al., 2007; Feng et al., 2010)."

*done*

Lines 125-126: "continuous light. Each strain was acclimated to growth on one of six growth condition concentrations":

The meaning of this sentence is not clear: was each strain acclimated to one Fe concentration before starting the experiments (which one?), or were both strains acclimated to each one of the six growth conditions before sampling? How long (number of generations) was the acclimation phase?

*Text modified: at least 3 transfers per experiment, >27 generations*

Line 242: "colonies since sexual reproduction is thought to require revisiting the flagellate life cycle stage.": Is sexual reproduction what the authors meant? Please provide a reference for this statement.

*No, sexual reproduction is distinct from colonial/flagellate transitions (and far less understood). This sentence was modified a bit since colonies can either reproduce by flagellate cell production or by budding new colonies. Rousseau et al 1994 added. New text:" The presence of both colony and flagellate cells is expected in actively growing populations since reproduction can involve returning to the flagellate life cycle stage (Rousseau et al., 1994)."*

Lines 304 -306: "6d and 6f, Supplementary Table 1). While during both experiments, cells were growing exponentially at the time of harvest, cell densities of strain 1374 were as much as 7.6 fold higher than in the experiment with strain 1871"

*done*

Line 307: "and as a result the denser 1374 strain might have also experienced iron stress"

*done*

Lines 313-314: "colonial *P. antarctica* spring bloom in 1998 were consistent with this interpretation, with ferredoxin concentrations below the detection limit and flavodoxin present (Maucher and DiTullio, 2003)."

*done*

Line 328: "and the proteome across the gradient in iron concentrations, we hypothesize that this diversity of iron stress".

*done*

Line 380: "organism, or with the influence of any other environmental stimuli in the genus *Phaeocystis*"

*done*

Section 3.5, p. 20: For genetic diversity and mixing of *P. antarctica* populations see: Gäbler-Schwarz and L. K. Medlin and F. Leese (2015). A puzzle with many pieces: the genetic structure and diversity of *Phaeocystis antarctica* Karsten (Prymnesiophyta). *European Journal of Phycology*, 50 (1): 112-124. <https://doi.org/10.1080/09670262.2014.998295>

*New sentence and reference added: Moreover, high genetic diversity has been observed across a large number of P. antarctica isolates and even within isolates co-isolated from a bloom (Gäbler-Schwarz et al., 2015).*

Lines 548-549: " mentioned earlier, division and growth of *P. antarctica* colonies is believed to require transitioning back through the flagellate life cycle stage": please provide a reference for this statement.

*Rousseau et al 1994 added*