

## ***Interactive comment on “Seasonal development of iron limitation in the sub-Antarctic zone” by Thomas J. Ryan-Keogh et al.***

**Anonymous Referee #2**

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general comments: In this paper by Ran-Keogh et al the authors present data on nutrient (iron) addition bioassay style experiments conducted in the sub-Antarctic zone of the S. Ocean. The papers describes the varying response to iron-addition on the phytoplankton community over the growing season and characterises changes in physiology, nutrient uptake and community composition. The paper then discusses potential causes of the relationship between biological demand for Fe and supply. The paper is well presented and is a useful addition to the important understand of the controls and limitations on primary production in this important oceanographic region. My main concern is that the authors are too strong in their conclusions (especially relating to the seasonal cycle) from a limited dataset and sections of the paper should better reflect these limitations of the study.

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specific comments: Three incubation experiments have been conducted. Which this is valuable data it is still only three data points throughout the growing season. As such conclusions as to how this data relates to a seasonal cycle should be stated with a bit more consideration. Especially as often the authors claim a development in iron-stress over the growing season while the most iron-stressed community seems to be mid-season? While this could be due to the selection of for example cells with reduced iron-requirements as iron-limitation develops it needs more openly discussed.

The authors infer accumulation of detached chlorophyll-binding protein as a mechanisms for low Fv/Fm during iron stress. If this is the case why does Fv/Fm not reduce in the set-up conditions (table 1). This is potentially a change in community – although the authors suggest the community is pretty consistent. Can the authors give a reason for this. Possibly plot Fm:Chl or similar to help support the arguments?

Is there a water temperature effect on magnitude of the deltaFv/Fm throughout similar studies from the author?

technical corrections Line 27 – suggests depend is greater than supply – the supply rate could still be high Line 74 – include a reference for this statement Line 87 – define more what eddy-strom interactions mean Line 232 – Be clear if there was no sig difference throughput the experiment Line 235 – I think the sigmaPSII data is in supplementary but please refer to this in the text Figure 2 – I think the lines are mis-labelled - +Fe and control should be the other way around? Line 304 – can you reference a paper that shows or discussed this bottle effect in more detail

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-551, 2018>.

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