Biogeosciences Discuss., 12, C8796–C8798, 2016
www.biogeosciences-discuss.net/12/C8796/2016/

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Interactive comment on "Blooms of cyanobacteria in a temperate Australian lagoon system post and prior to European settlement" *by* P. L. M. Cook et al.

Anonymous Referee #2

Received and published: 4 January 2016

General Comments: This is a good and thorough study which looks at a variety of biomarkers in sediment cores, located in Lake King, to investigate the occurrence of cyanobacteria from the past to the present and compare it to historical archives. The structure and organization of the paper is hard to follow, in particular the discussion which jumps from different time periods without fully explaining and supporting their idea until later. Suggestions for better organizing the discussion are found below. This is an interesting study with many supporting biomarkers. However I found the conclusion to be unoriginal. With some reorganization of the discussion and a more thought out conclusion this can be a great paper.

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Discussion Paper

Specific Comments:

Abstract: Not clear why this study was conducted or why it is important. I suggest putting in a sentence similar to 18831 line 18.

18831 Lines 11- 13: Not very convinced that “Gippsland Lakes provide an ideal case study” expand on explanation more.

18831 Lines 21-24: Great importance sentence.

18832 Line 24: Why did you choose this particular spot to sample? Is it representative of the whole Gippsland Lakes?

18833 Line 1 18835 Line 20: LKN1 core was exposed to light and heat, which would have degraded pigment biomakers. Then I see that you only used LKN2 for pigment analysis. How did you get pigment data for the earlier years?

18838 Lines 15-16: Pheophytin-a is only mentioned once here. Refer back to this biomarker in the discussion. Explain what this biomarker is used for.

Results: I suggest organizing the methods and materials in the same order you explain the results for the different proxies.

Discussion: I suggest rearranging the discussion following the same order as the results with the three different sections (i.e LK1-3) where each section you include the “factor controlling the incidence of cyanobacteria bloom” (18841 line 1 through 18842 line18). I believe it would be easier to follow.

18840 Lines 18-21. This sentence makes it seem as if the reference is for a study done in Gippsland Lakes. Rewrite to: “ . . .within Gippsland Lakes and this is comparable with previous studies done in the Baltic Sea (i.e. Bianchi et al., 2000 and Funkey et al., 2014).

18842 Line 7 11: Firstly and Secondly should be First and Second

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12, C8796–C8798, 2016

18842 Line 26-28: Can you provide a reference for this?

18843 Lines 1-3: Can you provide a reference for the 1939 wildfires?

18844 Line 10: change to- World War II

18844 Line 10: Where is the “increased nitrogen inputs” coming from?

18844: Lines 13-17: I’m not convinced this is the right conclusion for this paper. From your explanation in 18842 Line 3-18 cyanobacteria blooms have occurred in Gippsland Lakes even when there was low nitrogen and phosphorus inputs. Definitely reducing N and P will help alleviate the gravity of the spring and cyanobacteria blooms.

Figure 1: Add coordinates of sampling site.

Figures 2-4: The graphs are well done and clear. The captions however need to be expanded to describe all parameters and units.

Figure 34: What are LK1-3?

Interactive comment on Biogeosciences Discuss., 12, 18829, 2015.