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Climate of the Past Discussions

Interactive comment on "Amplified bioproductivity during Transition IV (332 000–342 000 yr ago): evidence from the geochemical record of Lake El'gygytgyn" *by* L. Cunningham et al.

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This is a very well-written and well-presented paper with few typographical erros. It focuses on the value of geochemical palaeoclimate proxy indicators across the MIS10-9 boundary in lake El'gygytgyn. As the authors justify clearly, this is a site of outstanding importance for studies of global climate change. With its many links to other recent papers, it is sometimes frustrating that the reader does not have access to the full material. It makes a clear contribution to the understanding of the strength of the proxy data, however. I would recommend it is published with minor corrections, as follows. I hope the authors can understand the line numbers of the draft on which I have worked.

References have not been checked. The title and abstract: it might be useful to include 'MIS10 to MIS9 transition' to facilitate web searches. P2 ln 12 (comma shift) can, and have, occurred is Ln 26 significant flow on affect. This should read 'effects' and still sounds strange. Perhaps reword 'within this region have feedback effects with alter global climate. Delete last sentence of paragraph, with repeats the argument of its opening sentence. Ln 28 There ARE insufficient data Ln 28 to constrain and validate regional-scale models adequately. (split infinitive) Base of p2 and top of p3: need references to support statements concerning data from Arctic Ocean and Greenland. For Greenland, 'two' glacial should be written in full. P3 ln 7. Rather than referring only to Frank et al., it is necessary to clarify what the temporal resolution of 'low resolution' was. Throughout, high- or low-resolution study is sometimes hyphenated and sometimes not. It should be when used as an adjective, as here. Check m/s. Ln13 should read BSi Ln 14 should probably read 'appeared to show' Ln18 There are important potential taphonomic issues in using BSi (and Si:Ti) as an accurate reflection of diatom-based productivity. Diatom dissolution and silica remineralisation can occur in the water column and in the post-depositional environment even in freshwater lakes. See e.g. Ryves DB et al. 2003. Limnol Oceanogr. 48(4), 1643-1661. This needs some mention, including in the list of assumptions. Ln22. Clarify whether this was 'real' evidence for correlation between BSi and temperature, based on modern studies, or whether it was inferred from the palaeo record. Ln 27 in THE catchment Ln 29 Repeat the inclusion of the resolution at which this correlation held. P4 ln 4. And p3 ln 28. Justify whether the assumption of constant catchment erosion input between glacial and interglacial phases is likely to be valid in this lake. If it is almost permanent ice cover there may be little input, but might one predict a pulse of erosion at every major increase in ice melt? Ln 8 mixing rather than mixes Ln 12 conditions rather than condition

P5 ln 1. Move the focus details to the start of methods. Here, replace with something like the MIS10-MIS9 transition... Delete the last sentence, which repeats arguments above. Methods Give the core location coordinates. Ln 20 at 0.25 cm and 1 cm ln21

1620 cm and 1660 cm Ln 25 remove gap before comma. Rosen should have an accent. P6 ln 1. State what the error margins are likely to be. Need to be consistent with decimal places. Is one dec pl. Justified? If not, ∼332 to 342 ka. But, looking at Fig 2, it looks more like 332.1 to 342.2. Can you be confident of temporal resolution to five years' accuracy? If not, 40-90. Results

Ln15-16 check use of decimal places throughout Ln21 This might be the first time you have mentioned MIS10. Mark on Figure 2. Ln 6 give figures for magnitude of increases and decreases. Need to say what D'Anjou et al. were working on. If proxy data were from the same core then you can say firmly whether it coincides. Their study may be low resolution but if it occurs at the same depth it would be useful to say so. Ln14 expand on the potential limitations of both techniques. Including your earlier inference of change rather than stability in catchment input p6 ln21. Could you use this to adjust the silica record somehow? Interpretation Ln 26 ARE interpreted P8 ln 1 MS is not a proxy for biological productivity? Ln8 The productivity response is unlikely to be a simple response to warming. It will often be combined with increased nutrient input (N,P), which you don't mention until the base of the next paragraph. Need to specify the indirect nature of the proxy response and its potential complexity more clearly. Ln5 it is disappointing that reference to other studies is so descriptive. An extra figure would allow the reader to assess how similar the records alluded to are. It is impossible to do so without reference to them. Ln 12 climate-related increases Ln 9 It would be useful to refer also to other studies on Elgyg referred to earlier. P9 ln 8 consistency: CO2 and CH4 (note subscript) or carbon dioxide and methane. Latter is better. And ln12, 14 Ln 21 conclusions. You say BSi lags behind other proxies, but this is not referred to clearly above. Need to specify that more clearly on p8 ln12. In the conclusion, add 'geochemical proxies analysed in this study', to clarify that you do not mean proxy data from other related studies.

Interactive comment on Clim. Past Discuss., 8, 5341, 2012.