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Climate of the Past Discussions

Interactive comment on "Wind regimes during the Last Glacial Maximum and early Holocene: evidence from Little Llangothlin Lagoon, New England Tableland, eastern Australia" *by* James Shulmeister et al.

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Please note that the revised manuscript with the changes for all referees is attached to the response to referee 1 and the new supplemental data are attached to the review of referee 2. As per the attached responses we have addressed all the questions of the reviewer.

We thank the reviewer for a very constructive and helpful review. The reviewer makes three major points. Firstly, regarding the age of the lunette, we agree that while it was active in the LGM we have not proved (or even intended to infer) that it was formed in

the LGM. We have modified the text accordingly (lines 225-228). Secondly we have modified the conclusion to infer either no change in circulation or a northward expansion of the winter westerly. Our data do discount a poleward contraction at the LGM and we now explicitly state this. Thirdly, the reviewer makes a good point about transport routes for fines in the lagoon. We have modified our text accordingly (lines 286-292).

Line 45-46. It is not really possible to be more precise. The zone over which the westerlies flow is quite variable and this is really a mean position for the northern limit. We can talk about the location of the northerly branch of the westerly jet in winter but as we have backed off statements about the jet, because of (correct) comments by reviewers about over-interpreting data, it seems inappropriate to mention it here.

Line 84. (line 86-88 revised) We have added "Salt concentrations in upland lakes tend to be low owing to groundwater seepage, restricting the preparation of pelletal clays for deflation and producing dominantly sandy lunettes."

Line 132: Add to "particle size analysis", dry seived, and analysed following Folk (1974).

Line 179-180. This is the same comment as Hesse and has been resolved by changing the feature description to a lunette.

Line 189. Exactly as per Hesse comment – changed to sand and gravel berm.

Line 218-219 and general comments. "How do you know the lunette is LGM age?" See response to Reviewer 1 (Hesse) on the evidence for sedimentation at the LGM, the interpretation of the OSL evidence and additional unpublished ages, and the possibilities of older aged sediments at deeper levels within the lunette.

The calculation of mass accumulation rates. This would be an excellent way to extend our research program on Little Llangothlin Lagoon. For the present study we were limited to a smaller number of OSL analyses, which were sufficient to describe the general timing of sedimentation.

Line 251 (line 254 onwards). We struggle to follow the argument of the referee here. We conclude that the sands are transported through the lake but do not see how the berm would have limited lake size until its matrix was emplaced – unless this is a comment on seepage. The GPR data are absolutely clear for the berm having wash-over features and a spit-like morphology (Fig 2a). Mixed grain size beaches have matrix fill to wave run up height and are (often) openwork above this level. This is consistent with the field and GPR data. The irregularly shaped basalt gravels are clearly detrital as stated in the next paragraph.

Line 262. While it is possible for a stream to transport granite derived sediment to the southern part of the lake during lowstands, there is no mechanism that we are aware of that would allow the sands to be transferred as matrix to the berm during a lowstand. Therefore, even if the sands were transported adjacent to the berm by this mechanism it would require a high lake level to move them into the berm. The four times we suggest are our age populations. We believe that we explicitly stated this in lines 267-270.

Line 271 and 274. (revised lines 286-292) The observation about lack of basalt derived material in the lunette probably relates to the different transport paths of fine and coarse material under wind and current activity (as this referee points out). The reference to Woodward et al., 2011 has been deleted as the referee is correct in stating that the mineralogy of the samples was not described in that paper.

Line 275. (revised lines 281-282) We explicitly state the sorting mechanism to be wind-blown waves.

Line 278. (284 in revised MS). February and August represent the strongest seasonal signals for summer and winter. It is well known (in Brisbane) that westerlies don't become persistent until later in the winter, similarly summer patterns are better developed later in the summer as westerlies withdraw southward off continental Australia. We chose these months to highlight the maximum summer-winter contrast. It is not an attempt to display average wind fields.

Line 294: We fully acknowledge that this argument is simply an argument for the observed pattern of sedimentation around the lake. However, this particular taxon Eleocharis sphacelata is cosmopolitan and found from the tropics of Northern Australia to southern parts of Australia and New Zealand. The growth is seasonal in cooler areas with senescence when the plant is stressed by cold weather at the start of winter. It grows rapidly when weather warms (http://archive.nwc.gov.au/__data/assets/pdf_file/0012/11235/Wetlands_5_sedgelands_and_ Thus, there is no reason why this taxon would disappear if the climate was 6-9C cooler. In addition, other rushes extend into colder regions and there is no reason why this lake would be rush-free. The idea of drainage in the west does not hold– as there is inflow on that side of the lake (not outflow) and the sediment supply conditions should be ideal for lunette formation on that side of the lake.

Line 320 onwards. We have now made it explicit that it is the effect of wind waves on a full lake that drives lunette formation.

Line 361 (line 370 in revised) 'wind' added.

Line 371 (line 384 in revised MS) – changed to 'lunette'

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