

Interactive comment on “Neoglacial trends in diatom dynamics from a small alpine lake in the Qinling Mountains of central China” by Bo Cheng et al.

Anonymous Referee #3

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This study aims to provide new data on the impact of long-term climate change on freshwater biodiversity in an alpine lake in central China. The main focus is to reconstruct trends in diatom community composition, their ecological guilds and beta-diversity in response to neoglacial climate change during the last 3500 years. The palaeolimnological approach of this study is solid but not particular novel. Only one palaeobioindicator (diatoms) are used and most of the environmental interpretations are based on other publications. The chronology of the sediment core is not too convincing thus the statement of a 55 year multidecadal resolution sounds a bit odd. Although providing valuable new data from this remote region this manuscript should be revised rather thoroughly before considering for publication in Climate of the Past.

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Please find below general and more specific comments, which should be taken into account when revising the MS.

General comments – Although I am not a native English speaker the language could be checked – the MS contains many misspellings, typing errors and sentences, where a word(s) seem to be missing – A lot of environmental information is missing under “Study region” description. You should add more information of e.g. mean July/January/annual temperature and precipitation, bedrock type, main vegetation, lake bathymetry, ice-cover duration, water chemistry (e.g. pH, Tp, TN, conductivity), presence of fish. . . without this information it is really hard to get an overview of the current environmental setting of the lake and to evaluate the possible drivers behind the diatom community changes. The major driver could be something else than climate change. . . – The interpretation of the results is often relative vague and based on general knowledge from other papers. The results are not supporting well the discussion and conclusion section, as the changes in the data are not synchronous or are rather small. More discussion based on the own results should be included. – The conclusions are based mainly of general knowledge of other studies and is thus not a good summary of the results of this study.

Specific comments

– Lines 48. “Here we take. . .” why not “Here we use. . .”? – Line 49. “Multidecadal variability” . . . on what data is this based? The dating seems to have a hard water effect (which has not been clearly addressed) and only five AMS dates. Please clarify how you have come up with this multidecadal (55 years) variability – Line 55. “Important” . . . what does this mean here? Important compared to what? – Line 61. Consider to add “productivity” to keywords – Line 77. Is there a word missing after “sensitive” e.g. “area” or “environment”? – Lines 82-83. “. . . but their habitats to many. . .” I don’t really understand this sentence? Is this needed? – Lines 140 and 145. Is the elevation of the lake 3370m asl or 3365m asl? – Line 152. What kind of piston corer did you use? Please specify – Line 153. “. . . from the central region

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of Lake Yuhuang Chi". Why from the central area, was it the deepest part of the lake? or the main sedimentation area? or had it the longest sediment sequence? Please clarify – Line 154. Why did you use bulk organic sediment for dating? Where there no terrestrial plant macrofossil in the sediment? – Line 158. Its rather unclear how you came up with the 1340 year reservoir age effect. Please clarify this in sufficient detail and add the number of dates to line 156. – Lines 163-164. What does this sentence mean? How did you came up with a resolution of 55 years considering the uncertainties of the datings? What is the frequency of the diatom samples, 2mm, 5 mm, 1 cm. . .? – Line 165. Please add a reference(s) after "...standard procedures". – Lines 169-170. "...such that suitable concentrations could be calculated". What does this mean, please clarify – Line 207. Please add a reference after "C2 Data Analysis Version 1.7.2" – Line 214-> this is a bit odd paragraph as it contains only Table 1 and no written results? – Line 215. In Table 1 all +/- ages are 30 years, is this correct? – Lines 239-240. This sentence could be combined with the previous one as the information is almost the same. – Lines 256-257. The first two sentences of the Figure caption could be e.g. "Diatoms with a relative abundance >3% in more than one sample are shown" – Line 263. Please add "Relative abundance (%)" below the diatom stratigraphy figure – Line 272. Please add "Relative abundance (%)" below Figure 4 – Line 282. The beta-diversity value of 1.033 SD units is rather low and indicates relative subtle changes in the core (compare e.g. to values in Smol et al. (2005, PNAS)) – Line 303. Fragilariaceae are also very common in high latitude lakes. . . you may add a reference after this statement – Line 329. *H. Schmassmannii* is not really replacing *S. exiguiformis* as its relative abundance varies between ca. 10-15% during this period and *S. exiguiformis* decreases from ca. 50 to 40%...this does not really seem as a replacement, or? This is a too strong interpretation, please re-phrase – Lines 337-338. "...resources stabilised or even increased slightly. . ." How can this be seen in the results? Which species or index is confirming or suggesting this interpretation? At least not the relative abundances of Figs 3 & 4 . . . – Line 343. High profile G2-diatoms dominate the whole zones 1 & 2 with an relative occurrence around

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60% (see Fig. 4)...so there are no real changes here unlike is suggested – Lines 337-344. This whole paragraph consists of rather vague speculation without much of supporting data from the study. I would suggest you to re-evaluate your results and re-write this accordingly – Lines 348-353. Please change the numbers of sub-figures to be 6b, 6c, 6d etc. – Line 358. Please add "Winter" before "temperature" – Lines 368-369. This is not clear in Figure 6c – Line 379. "Increasing diatom flux. . ." the relative abundance data does not really support this. . . could there be some problems in counting the diatom flux as the dating results are not very convincing and the sedimentation rate has a large impact on the flux values? – Line 380-381. "Driven mainly by increasing *P. bodanica*". . . that is not clear when looking at Figure 3. . . *P. bodanica* seems to have a relative abundance around 20% before and after this period. Please check and re-think – Line 382. Beta-diversity does not increase between 1500-800 cal yrs BP. Please re-phrase – Line 398. How come beta-diversity is almost zero although in Fig. 3 a relatively diverse diatom population still remains? – Lines 421-422. ". . . planktonic diatoms show a distinct decline during the LIA". Where can this be seen? In Fig 3. the P:L ratio does not decrease nor does the abundance of *P. bodanica* and also the planktonic guild is high in Fig 4? Please clarify – Lines 425-426. I doubt that the appearance of *H. Schmassmannii* is due to low water temperature? Do you have any data when this species blooms? Or what its temperature optima is? This species can be found also in high latitude lakes – Line 429. ". . . the lake becoming more shallow due to increased aridity". . . The planktonic species *P. bodanica* still occurs with a relative abundance of ca. 20%, which could indicate deeper water as it needs turbulence to sustain in the water column. Could one explanation be that the water became clearer due to the frozen ground and less inwash of e.g. DOC/humic substances? – Line 448. ". . . around the time of the did. . ." please re-phrase – Lines 456-472. This whole paragraph is rather general based on other publications instead of your own results. I think this whole paragraph should be re-written so that it reflects the results of this study – Line 548. Please add the reference for the program C2 here. . . Juggins. . . – Lines 659-664. Please switch the alphabetical order of these

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two references

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