

Interactive comment on “Synchronizing ^{10}Be in two varved lake sediment records to IntCal13 ^{14}C ” by Markus Czymzik et al.

Anonymous Referee #2

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General comments

This manuscript by Czymzik and co-authors targets to a key issue in paleoclimate records i.e. time-scale uncertainties, which often inhibit the detailed investigation of multiple spatial high resolution climate proxy records. ^{10}Be records from two varved lake sediment sequences from northern Germany and Poland are synchronized with IntCal13 calibration curve. This methodological approach is a novel attempt to synchronize lake sediment records using ^{10}Be in order to investigate the leads and lags, unwanted but inherent features in all proxy records. Large (and growing) number of the high resolution paleoclimatic studies is published from lacustrine sediments but the detailed comparison of the proxy records suffer from the temporal uncertainties. From this perspective, the manuscript contains interesting ideas and is topical. The text is

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well written and structured and has illustrations of high quality to support results and interpretations very nicely. The main point what I miss in this manuscript would be a visual illustration of the sediment composition and composition changes from the two sediment records with SAR, TOC and perhaps Ca, Ti and 10Be variability, at least for the time windows that were more closely inspected. Although the references to original publications are provided, the illustration would greatly help to follow the detailed discussion from two lake records with several proxies and time windows and changes in sedimentation. Overall, this manuscript is suited for the journal of Climate of the Past discussions and can be accepted with minor revision.

Specific comments

Page 2 Line 26: Could it be shortly explained how the non-uniform 10Be depositional patterns are generally taken into account/expected to influence the records?

Page 3 Line 9: No major inflows, today. Well, were there major inflows previously? What kind of changes in inflow system have occurred and when? Does this influence the sediment composition within the time interval of the study, e.g. the changes in sedimentation rate or sediment composition? If not, this should be mentioned as well.

Page 3 Line 20: at 20 year resolution. This is not clear to me; do you mean one sample every 20 years, or a sample comprising 20 years?

Page 3 Methods – Page 4 Results: Overall, this section leaves me a bit confused. For a reader I feel I am left with a tenuous grasp on the TSI and CJ records. Although the references are provided it would be helpful to shed light on these previously published varve records that are frequently referred in the text, e.g. where the non-varved sections are located and how the sediment composition changes (in time/depth scale)? An illustration of the records perhaps with some Ti, Ca TOC and even 10Be variation curves would be helpful to quickly get an overall picture of the two records.

Page 4 Line 27: Although references are provided it would be helpful to mention briefly

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how environmental and catchment conditions can influence the 10Becon variation in sediment record.

Page 5 Line 12: The correlations could be added in the figure 4 similarly as is done in figures 2 and 3.

Page 5 Line 19: Could these depositional mechanisms be briefly described?

Page 5 Line 20-21: At this point it does not become clear which correlations are referred. This becomes clear later in the paragraph but text would be easier to follow if the correlations were specified before showing the numbers.

Page 6 Line 8-9: Why? Are there indications in the sediments that suggest resuspension of littoral sediments or changes in sediment focusing? The illustration of sediment composition (see general comments) could be helpful here.

Page 6 Line 29-30: This (also) would be nicely clarified with the record-describing illustration (see comment for Page 3-4 Methods-Results).

Page 7 Line 1-2: What is this layer? Does this occur at the time interval discussed in this paper at Page 6 Line 6 (from -50 to 0 BP)? If so, this could be mentioned already earlier. This would actually answer partly to the specific comment I made for Page 6 Line 8-9.

Figure 4: Why 10Becon and 10Beenvironment are out of phase in Lake Czechowskie from about 2700 to 3100 BP?

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