

***Interactive comment on* “Synchronous variations of precipitation and temperature at Lake Qinghai, NE Tibetan Plateau during the past 800 years and their relations to solar activity: evidence from Li/Ca ratios and  $\delta^{18}\text{O}$  values of ostracod shells” by Z. Zhu et al.**

**Anonymous Referee #2**

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Zhu et al. discuss oxygen isotope values and Li/Ca ratios from ostracods in terms of precipitation and temperature changes at the NE Tibetan Plateau. They see common variability with cosmogenic radionuclide records and suggest a solar influence on precipitation and temperature at Lake Qinghai during the past 800 years.

I think the data presented in the paper are potentially very interesting. However, I agree with the previous comments that there are several uncertainties that are not adequately

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addressed. Therefore, I cannot follow the conclusions presented in the paper.

Major comments:

It is obvious that the age model stands on a very weak ground and that this is a problem for the comparison to independent data as e.g. the solar activity reconstructions. It definitely needs more details about the synchronization of the records and uncertainties of the time scale. Statements as for example "...and the age uncertainties is only one year..." are not really believable and it is not clear if this is claimed for the whole record. In addition, sentences as for example "...the sedimentation rate derived from  $^{210}\text{Pb}$  radioactivity correlates quite well with that from  $^{137}\text{Cs}$ ..." are not clear. What does "quite well" mean? The jump in the sedimentation rate around 5 cm is not well explained. Why is this jump so abrupt and how well is it defined? In addition, it seems unlikely that the depth-age relationship is linear below 5cm considering the precipitation changes as suggested in the paper.

Zhu et al. discuss the connection between  $\text{d}^{18}\text{O}$  and precipitation. However, to me the most interesting figure in this context is missing: A comparison of  $\text{d}^{18}\text{O}$  of the ostracod shells and measured precipitation values (or a proxy for past changes in precipitation in the region). Zhu et al. refer to a paper in preparation by Zhu et al. that, in my opinion, should be published before ongoing discussions about the data are made (the present paper). The same is true for the  $\text{Li}/\text{Ca}$  ratios. One would wish that the claim of a "temperature-controlled proxy" is somehow justified by comparison with recent instrumental data or proxy data from nearby records.

Figure 7. I am not really convinced that precipitation and temperature agree so well during the last 40 years at Lake Qinghai. The authors should use objective methods to justify this conclusion. From looking at this figure I would conclude that temperatures show an increasing trend but that the precipitation is rather stable. Only some of the shorter-term features seem to agree. In addition, it is not clear if the data are smoothed or if they represent annual values?

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Comparison to solar activity estimates. The comparison of climate proxy data and solar proxies should again be done in an objective way. Looking at figure 8 I am not convinced that there is indeed a good agreement between climate and solar activity. A correlation analysis could help. Figure 8b shows a record inferred from 14C data. However, the reference (Stuiver et al., 1998) refers to the original 14C data and it is unclear how the resulting curve in figure 8b is inferred from this. Considering the dating uncertainties, even a good correlation between climate and solar proxies would not necessarily point to a connection between sun and climate in this region. In addition, figure 8 obviously shows smoothed data. It should be explained how the data were treated.

The use of references should be improved. In many cases the references do not exactly fit the statements in the text or the statements are too strong compared to the results presented in the referenced paper.

Minor comments:

Page 1494 lines 25 ff: "Obviously, solar activity is considered as the dominating factor to influence Earth's temperature variations" I do not necessarily agree with this statement and I do not think that all of the papers referenced at the end of this sentence suggest this. Quite often such studies infer precipitation or other climate factors and certainly the papers about solar activity reconstructions do not automatically imply a connection to temperature variations.

Page 1496 line 21:  $778 \cdot 10^8 \text{ km}^3$  seems to be too large compared to the surface area of  $4340 \text{ km}^2$ . The same for Mono Lake. I guess there is a confusion between  $\text{m}^3$  and  $\text{Km}^3$

Page 1496 line 22ff: Temperature variations... are these daily mean temperatures or maximum temperatures... please provide the details.

Page 1497 line 29 ... the precisions was less than... do the authors mean that the

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deviations between the 3 duplicate samples were smaller than the measurement accuracy?

Page 1503 line 18ff: the reference list does not fit to the claims in the sentence. For example, Hodell et al. do not discuss the Asian summer monsoon

page 1504 line 11: beacause-> because

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