

# ***Interactive comment on “A new high-resolution pollen sequence at Lake Van, Turkey: Insights into penultimate interglacial-glacial climate change on vegetation history” by Nadine Pickarski and Thomas Litt***

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This is an interesting article that shows new detailed pollen and oxygen isotope data from the MIS 8-6 part of the Lake Van sedimentary record. The authors interpret the pollen and isotope changes as changes in vegetation and precipitation/evapotranspiration around the lake basin. Vegetation changes between forested-steppe environments can be correlated with climate oscillations (interglacial/interstadials-glacial/stadials) described in the marine isotope records. The paper is well-written and the data support the interpretations/conclusions and thus de-

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## Interactive comment

serves publication in CP. However, in my opinion, there are some changes that need to be done before publication and several topics are not very well discussed in the manuscript and need to be clarified. Below are my comments:

-It is not very clear what is really triggering the vegetation changes in the area - is it mostly temperature or precipitation? In some parts of the text temperature is indicated as the main trigger and in some others is precipitation or effective precipitation (supported by the isotope data). A clear example is the Abstract (lines 11-13) where effective precipitation is first introduced as the main trigger and then temperature...and this is very confusing as maximum insolation and thus maximum temperature would reduce the effective precipitation and should not produce the same effect on the vegetation. For example, in line 13 – maximum forest development during stage 7c does not seem to occur during summer insolation maxima. . . .

In this area, where precipitation is not very abundant I would think that forest development would be mostly related to precipitation or effective precipitation. I think you should be consistent throughout the text.

-I also had the feeling that after reading the text and looking at the figures one still lacks of a clear idea of what is the relationship between insolation and plant dynamics in this record. In lines 268-269 it is stated that "...vegetation development (forest?) is clearly controlled by insolation forcing and associated climate regimes (high summer temperature, high winter precipitation)". I understand here that forest development in this area is "clearly" controlled by summer insolation, so in a very simplistic model if we had high summer insolation we would have had high forest development. This is a model that can be applied to several long Mediterranean records (see Tzedakis et al., 2007). However, if we look at figure 3, the major forest development seems to happen during summer insolation minima, so completely the opposite of what it is said in the text. Check stages 7e and 7c. What I understand from this is that forest cannot develop during periods of insolation maxima (and probably precipitation maxima) due to very high evaporation and that would explain the big lag between them. The vaguely

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mentioned lag in the text (line 315) is not just 2-3 ka...but about 10 ka (ie. stage 7c). This subject should be further explained and clarified in the text.

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-I am also puzzled about the isotope record from the lake and the comparison with the pollen data. First, if the interpretation of the data is correct (higher values, higher evaporation/dryness), the isotope data do not seem to agree with the summer insolation and it should. Second, if the vegetation was delayed because during summer insolation maxima there was too much evaporation, this would show a delay between the isotope data and the pollen and they basically covariate (except for some periods (stage 7a). Please clarify.

-The fact that stage 7c shows one of the largest forest development in the record needs to be highlighted in the chapter about “Comparison of past interglacials at Lake Van”.

-It is very confusing to see terms such as “steppe forest landscape” “oak-pine steppe forest” or “oak steppe forest” as these two terms “forest” and “steppe” are quite opposite. Why not calling these forests with AP pollen percentages around 60% “forests” or if you do not agree that they are close forests “open forests”? Also, steppes are mostly characterized in the area by *Artemisia* and *Amaranthaceae*, and *Poaceae* seems to be relatively abundant during the “forest” periods so it would not be quite an “steppe” environment.

-Even though there is certain variability during MIS 6 the forest oscillations are only between 0-10%. I would not call these oscillations “pronounced” as stated in the abstract (line 23). The authors should soften the language regarding these oscillations (section 4.2).

-Line 10. “The presented record displays the highest temporal resolution for this interval”? from where? Lake Van? Turkey? The World? Please be specific.

-*Pinus* has an important role in the observed vegetation changes in this record and probably were important tree taxa regionally as well. Therefore, I think the authors

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should give some information about *Pinus* distribution in the area or regionally at Present in "Site description" as later it is mentioned that was transported to the area by the wind (lines 235-238).

-Line 120. Give unit for the "4 cm" size samples - cm3 ?

-I think the presence of *Spiniferites* should be better explained as many people would interpret this taxa as marine species. Do they occur in lake environments? Under what circumstances?

-Lines 195-196. "The  $d_{18}O$  composition of the lake water becomes progressively more enriched during interglacial/interstadial periods". Not fully true – check stage 7a where the opposite happened. Please be more specific.

-Lines 197-200 – This statement is not clear – in Fig. 3 the isotopic changes are explained and changes in dryness or evapotranspiration, supported by low detritic input in the lake.

-The charcoal record is clearly related with forest fuel. Be then more specific in line 217, "...vegetation communities changed towards more forest environment"?

-If I am right, the melting of the glaciers mentioned in lines 220-221 are not well supported by the data – this would be shown by high detritic input into the lake during deglaciation, which is not the case (see 7e, highest forest, highest evaporation and lowest detritic input). Not clear...

-Lines 239-241. This is not clear – please rephrase.

-Lines 242-245. The vegetation shift towards more *Pinus* does not seem to be due higher continentality as stated here. Check Fig. 4, where the peak in *Pinus* seems to be reached during the lowest seasonal contrast (low summer insolation and high winter insolation – cooler summers and warmer winters).

I hope my comments help improving the manuscript.

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