

Interactive comment on “Late Pliocene and early Pleistocene environments of the north-eastern Russian Arctic inferred from the Lake El’gygytgyn pollen record” by A. A. Andreev et al.

Anonymous Referee #2

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The manuscript presents an exhaustive set of pollen data from the Plio-Pleistocene of Lake El’gygytgyn. The data are of high quality and of extremely high scientific value as they provide unique information on past vegetation and climate conditions from a well dated sequence of northwest North America.

The manuscript is dealing mostly with pollen data providing detail information on the assemblages and related vegetation on regional scale. Quantitative interpretation in terms of climate conditions is, however, presented in a very general manner. Similarly, comparison with other Pliocene climate records is too general to be really informative. More insight into climate estimates and their uncertainties in terms of winter vs. summer temperature and precipitation would be useful for paleoclimatologists. Beyond

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these general considerations, some questions or suggestions are made below.

In the introduction, there is reference to temperature changes relative to present, but there is no description of the present day context. The modern settings (climate parameters and vegetation) of the study area need to be presented. In particular, what is the modern vegetation and climate? Does the temperature increase of 2°C the Arctic since 1961, which is mentioned in reference to IPCC, applies to the Lake El'gygytyn area? In the difference between paleo- and modern temperatures, is this 2°C taken into account or not ?

Betula and *Alnus* are indicated to be shrub pollen taxa at many places in the text. However, *Alnus* is presented as tree taxa in some sections referring to macrofossil remains. This needs to be clarified. In any case, the authors should explain how they differentiate trees from shrub based on the pollen grains.

It would be very helpful to illustrate the location of sites referred to in the text. In the comparisons, reference to climate estimates from the Canadian Arctic and Greenland sites (e.g., Csank et al., Bennike et al.) would be relevant. Similarly, some comments about the biome reconstructions by Salzmann et al. would have been useful for the reader.

In figure 3a, the concentration units are missing. Were pollen fluxes calculated? They could provide useful information on pollen production, and possibly distal atmospheric transport ?

Inferences about water level or humidity are made based on *Sphagnum*, *Pediastrum* and other palynomorphs. Are there other tracers, sedimentological, geochemical or isotopic, that could document the water level ? Would it be possible to develop a humidity-precipitation index ?

When presenting temperature reconstructions, it would be useful to give the absolute values in addition to the anomaly and to provide indication about the variability and

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uncertainty of the signal. Similarly, when possible, it would be relevant to discuss the seasonality (winter vs. summer temperature) and precipitation.

Pollen preservation is discussed but the preservation criteria are not mentioned. What about the pollen taxonomy ? Is it exactly the same than the modern one ? Was *Sciadopitys* pollen observed ?

The pollen data are clearly unique. Hence the resolution of analyses should permit to discuss the climate stability, instability and rapidity of the transitions. To document this would add value to the manuscript.

In brief, the data sound excellent but their climate significance could be more explicitly presented.

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