



EGUsphere, referee comment RC1
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Comment on egusphere-2022-366

Anonymous Referee #1

Referee comment on "Palynological evidence reveals an arid early Holocene for the northeast Tibetan Plateau" by Nannan Wang et al., EGU Sphere,
<https://doi.org/10.5194/egusphere-2022-366-RC1>, 2022

General comments – Overall quality:

The authors touched an interesting topic for the north-east Tibetan plateau, which has a contradictory discussion in literature recently: they want to prove the hypothesis of an early Holocene arid phase. They presented a palynological study including other proxies from a lake sediment core. They sample, analyzed and compared recent as well as fossil pollen samples from the region. Their recent pollen samples come from all important vegetation units available in the region, while the fossil pollen derived from the Gahai lake sediment core situated in about 3,400 m elevation covering the last 14.2 ka. Their sediment core is also used to analyze other proxies (ie. grain sizes, TOC and TN).

For their pollen-data analysis they use standard labor techniques as well as adequate advanced statistic methods which allow a reconstruction of different climate parameters like precipitation and temperature. However, their statistical basis with generally only 100 terrestrial pollen samples counted is quite low. Moreover, the study misses a deeper discussion of recent pollen samples taken close by their lake in order to estimate the amount of long-distance transported pollen taxa to that location. This discussion should have allowed for the rough calculation and discussion of correction factors in order to estimate the amount of recent foreign pollen taxa and use them as a general value for the interpretation of the past. Additionally, the grain size data of their lake sediments are not sufficiently discussed in order to support their (paleo-)climate interpretations based on their palynological study. Some of their arguments in this interpretation are speculative and did not cover all possible climatic influences which could have modify the grain-size distribution in their lake record. For example, the discussion about the possible influence of wind and evaporation in their dry phases needs to be included in order to estimate grain-size variability and lake level changes in their sediment record. In this sense, chapter 5.3 should be rewritten. Furthermore, the authors gave no comments to the radiocarbon age reversals between 191 to 279 cm core depth! In summary I argue for a

major revision of the manuscript!

Specific comments (line by line):

52: Show all records mentioned in your figure 1

80: "*such arboreal pollen amounts*"

97: "*Gahai Lake recently belongs to*"

135: Why do you include elevation? What is the meaning of elevation in climatic terms in your region? Is it cold resistance and/or dry resistance for the plants? How is P_{ann} distributed in your region regarding elevation?

225-227: Reformulate sentence. How did you define warm and wet? What about Mt_{wa} ?

228-229: you mean: "*Pinus, Picea, and Betula* **pollen**..." That is the influence of wind dispersal of these taxa. With which amount appear these taxa in dry areas? Specify!

260-267: Add information and comments/explanations of the age reversal in the dated samples between 191 and 279 cm depth showing in table 2!

278: "...while *Pinus* **pollen amounts** increase...". Also in further sentences: it is not the taxon itself, but the amount of pollen grains of the taxon which increases/decreases!

298: In which direction is your general increasing trend? I can't see it straight. The four stages are not clear and are not shown in your figure 7.

341: "...particles >50mm" up to which size? But these particles could also be transported by fluvial activity! Discuss!

346-350: This discussion is not convincing: silt is also easily transported by wind, while high amounts of clay may indicate calm/slow water transport and/or intensive weathering in the catchment. Sand can also be transported by running water. Did you checked the polish features of the quartz grains under the microscope in order to differentiate between aeolian and fluvial transport?

357-359: What amount of these pollen taxa appear in your recent pollen samples close to your lake and/or in the top sample of your core? May be, you can use these values as correction factors! Moreover, these taxa might indicate phases with higher wind speed as well! Compare the pollen data closer with your grain size data!

373-378: You suggested an extremely arid climate between 14.2 to 7.4 ka: but your grain size data do not support that strongly, even the P_{ann} reconstruction is contrary (figure 7). Why don't you show the light blue (excluding arboreal taxa) curve for the whole core? Comment on this!

379-446: In general, the whole chapter 5.3 needs a deeper discussion: ie. you are assuming arid conditions between 14.2 to 10.8 ka but weak aeolian activity, why? High clay amounts could also speak for a deeper lake! Do you have former strand lines around your lake? Again, why don't you show the light blue curve in figure 7 for the whole profile?

401-404: You argue for a cold and arid climate, but meanwhile your water level is supposed to have increased and your P_{ann} still shows high amounts between 10.8 to 7.4 ka! How could the supposed enhance wind strength you mentioned could have reduced the water level of your lake due to enhanced evaporation? Discuss!

405:408: Why could the silt fraction after 7.4 ka be indicative for a lake high stand? Why not for more wind? Your P_{ann} after 7.4 ka first is still high as before, but goes down at about 4 ka. Explain!

436-437: Again, explain the grain size- distribution and your "weaker water dynamics"! What do you mean with weaker? And why only sand is indicative for aeolian activity. What

about the occurrence of single extreme rain events under an arid climate? They could also bring sand into your lake!

441: What about other "introduced" taxa due to human activity?

445: Why is the increased silt fraction indicative for increased surface erosion. What transport mechanism? Wind? Fluvial?

445: A figure with the compared other sites you mentioned in chapter 5.4 and their main proxies should be shown.

Technical comments:

Figure 1: Show all other lake sites. Use other color/sign for your recent pollen samples in Fig. 1a, light blue crosses are hard to identify. There are so many recent samples in some regions that they are hard to identify individually. May be add a figure in another scale to show the detailed distribution of the recent pollen samples. Add the modern pollen samples in Fig. 1b and show the vegetation units, not only elevation (or add recent pollen samples and vegetation units of your catchment in an extra map)

Figure 2: please enlarge it!

Figure 5: please enlarge it and add a depth scale!

Figure 7: please enlarge it and add a depth scale! The scale for the light blue curve partly is out of range of the scale on top! Why do you show the light blue curve only for the time before 7.4 ka? Show it for the whole record!