Climate
of the Past

Discussions

# *Interactive comment on* "Intra-seasonal hydrological processes on the western Tibetan Plateau: Monsoonal and convective rainfall events $\sim 7.5$ ka ago" *by* Linda Taft et al.

**Anonymous Referee #1**

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Summary:

The authors investigate Mid-Holocene lake sediments of the Nyak Co lake side in an attempt use fossil evidence to infer intra-seasonal hydrological processes, identify and assess the significance of important moisture sources for the lake dynamics. The precipitation of the Nyak Co lake side is in proximity of the northern extent of the SW Asia summer monsoon, making the site potentially valuable in the detection of past changes of this extent. Five gastropod (Radix) shells provide most of the basis of the work, and they are subsampled to be used for temporally high resolution archives showing variability on a sub-annual scale. One of the authors' main conclusion is that

the northern extent of the Asian monsoon was different in the Mid-Holocene.

The manuscript presents new data potentially useful in addressing a number of hypotheses. The addressed problem is within the scope of CP. However, the data is insufficient in addressing the problem of changing monsoon precipitation in the Mid-Holocene, and related (rather substantial) conclusions cannot be made based on the presented results. Results and data seem overinterpreted. Not all scientific assumptions and methods to address this problem are clearly stated or valid. Scientific quality is further compromised by a lack of discussion of the large body of work related to monsoon or climate reconstruction of the Mid-Holocene. Presentation in text and figures do not allow the reader to easily follow. Given the serious flaws of this manuscript, I cannot recommend publication of this manuscript in its current form and with its intended focus, but I do believe the data are valuable in scientific discussion with different (and clearer) focus.

Specific comments:

Geographical and geological settings are well described. However, given the focus and the listed implications of the study, the introduction does not provide an adequate overview of the modern- and palaeo-climatology in the region. Most statements about it are vague and use confusing or inadequate descriptions. Furthermore, previous Mid-Holocene reconstruction efforts, such as PMIP simulations, are not mentioned at all. The description of monsoon dynamics that would allow more merited discussion of results and interpretations in that context are superficial. Furthermore, the goals laid out for the study in the introduction are very broad and beyond the scope of any single study. There is no mention of the specific hypotheses the authors seem to want to address. Consequently, the introduction does not sufficiently focus the reader on a problem.

The method section is on one hand lacking descriptions (e.g. computation of correlation coefficients and parts referring to software tools rather than the methods the

software tools apply). On the other hand, the processing steps for the samples are described in such detail that would be more merited in the supplemental material. It is unclear why this detail is needed in order to understand and discuss the results. However, I must acknowledge that my expertise does not cover such methods, so I am not able to truly assess the necessity of this level of detail.

The results section is difficult to read as it often does not highlight important results, but refers to tables instead. It does not feel like the reader is guided through the results in a manner that would also allow them to better understand the discussion that follows. These tables also include details that do not seem directly relevant to the problems the study addresses.

The reasoning in discussion is not easy to follow and insufficiently referenced when climate is discussed. In many cases, the authors seem to make interpretations without presenting sufficient evidence. Furthermore, the authors do not use existing studies, specifically studies reconstructing Mid-Holocene climate, to help them in their interpretation and put their results in context. The way it is presented, the main conclusions regarding climate, specifically the monsoon extent, are not supported by the results. In the introduction, the authors state they aim to separate moisture sources signals, but 1) it is unclear how they do this and 2) they do not take advantage of existing palaeo-climatological studies that would provide a more solid basis for such a discussion. Furthermore, by the very definition of climate, the question of a climatological changes in the monsoon is not one that could even potentially be tackled with the sample size used as a basis for this study.

The figures are insufficient in quality and quantity. Some labels are impossible to read, and the relevance of figures to the focus of the manuscript is not always immediately apparent. On the other hand, there are not enough figures to guide the reader through the study. It is difficult to get an overview of all information given in the text, and there are no suitable figures to help with this. For example, there is no figure to summarise 1) the climatic setting, which authors picked as their focus, 2) the distribution of modern-

and palaeo- oxygen isotope values, which would be important for the discussion, and 3) the different types of findings and interpretations that ultimately lead to the main conclusions.

The general structure of the manuscript is good. However, there are serious flaws within each section, and the manuscript lacks focus overall. It is often unclear why certain items are mentioned at specific points in the text. This makes it especially difficult to follow the authors' reasoning. It often reads as disconnected pieces of information the readers seem to be expected to piece together on their own. Given the broad audience and expertise of CP, more (concise) explanation and guidance is needed.

While the language only has few grammatical issues, it is often vague. Furthermore, the vague nature of the language used when discussing climate gives the impression that the authors are not accustomed to discussions with the climate community. If this is the case, I would recommend closer collaboration with the climate community.

While my expertise is (palaeo)climatology and I do have a background in palaeontology, I found it very difficult to follow parts of the manuscript. In some cases, I am not sure if the reasoning itself or simply the presentation of the reasoning was problematic. It would be easier to assess the scientific quality if the presentation quality were better.

Overall, I believe the authors have a valuable dataset that is potentially useful for testing a number of different hypotheses. However, the manuscript has serious flaws. Its major flaw is presentation and the attempt to tackle a climatological problem that 1) cannot be solved with only the data presented here, and 2) requires consideration of the abundant work of the (palaeo)climate community, which is almost completely ignored here. Due to those and aforementioned flaws, I cannot recommend publication of this manuscript in CP, but hope and suggest that the authors take full advantage of their valuable dataset by 1) deciding on one clear focus for the manuscript, and 2) addressing testable hypotheses either within their fields of expertise or in close collaboration with the climate community, and under consideration of the existing body of

work.

Technical specific comments:

L24: "Billions of people depend on ..." - please specify the nature of this dependence and state exactly what is meant by that. L38: "during" is not needed here. L53: In order to avoid confusion, when referring to monsoon characteristics. I suggest refraining from speaking about "atmospheric circulation patterns", a term with a more specific association in the climate community, L54: I presume the geographical extent is meant by "distribution". I suggest explicitly stating so. L56: The phrasing of the first part of the sentence is rather confusing. I suggest being more specific, e.g. "represents the source of water for large regions ...". L57-58: It is not clear what the authors are trying to say here. I presume the authors want to emphasise the ecological and societal importance of studying the climate and hydrology in the region. Please be more clear. L77: Another important factor to consider is the tectonic history of the study region. L79: Please also consider model-based reconstructions of palaeo moisture sources. L89-91: This sentence is confusing. I presume "was warmest and most humid" refers to only times within the Holocene, is talking about the Middle- (rather than Early) Holocene, and refers to to the Holocene Climatic Optimum. Please rephrase and clarify that. L96: What about differences in westerlies? L119-122: These are very broad questions. It is unclear what specific hypotheses are tested in this study. L227: If the data from the sites not marked on Fig. 2 are used in this study, please mark them on the figure instead of referring to another publication. It will help readers keep track of everything while reading the manuscript. L228: Please indicate clearly on the figure (using letters as reference or marking the outcrop in the legend) where this outcrop is. Is it B? L240: For interpretation and reproducibility, a mention of the actual method is far more valuable than mentioning the software, esp. when the software is not open and easily accessible to all. L260: This sentence is incomplete. "[...], but at Chiao Ho we did find such particles."? L260-263: Discussion of confidence are misplaced in the method section. L256-347: I am no expert in these methods and also cannot

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judge the necessity of having this detailed information in the main manuscript rather than supplementary material. However, given that many of the details seem irrelevant for interpretations later and are not mentioned again, I believe much of it can probably moved to the supplement. L387: Please summarise your findings/interpretations of Mid-Holocene environments instead of simply referring to a table and letting the reader do that work, esp. since the tables contain more than only the information mentioned in/relevant to the text. L395: Again, a quick summary of results/highlights is necessary. Without this to guide the reader, the manuscript reads more like a data dump, and esp. readers from different scientific disciplines will have serious troubles with the manuscript without this sort of guidance. L406-407: Why are these correlations mentioned? How was this calculated? What kind of correlation measure was used? This is missing from the methods. L427-429: What is this assumption based on? L579-633: Why is this interpreted as monsoonal precipitation and changes? The reasoning is not clear and this interpretation is made without any discussion of palaeoclimate reconstructions, such as modelling efforts, which exist and can provide context for such discussion. L642-644: See above. Furthermore, 5 samples, corresponding to 5 different years, are not sufficient to make any significant interpretations of monsoon dynamics. L682: Even if one could confidently attribute measured signals to monsoonal precipitation, the sample size of the data used as a basis for this study would not allow general statements about such differences in climate at the time.