

Re-Review of the paper entitled “Sporopollen evidence for Late Miocene stepwise aridification on the Northeastern Tibetan Plateau , submitted to *Climate of the Past*:

The manuscript analyses pollen records that indicate a two stage stepwise aridification of the study area (Tianshui Basin in the eastern Longzhong Basin) during the Late Miocene.

I still have one point that seems slightly confused to me. This is the discussion. In the revised version the discussion is indeed deepened and has improved, but does, in my opinion, not lead stringent to the drawn conclusion and is highly speculative.

Discussion:

In general there is some inconsistency in the discussion: you first explain the continental-scale effects of Tibetan plateau uplift on climate deduced from modelling studies, then you talk about comparing proxies and models (without doing so!), then it's about uplift histories (proxy) and you compare this to the evolution of the Asian monsoon (also from proxy evidence). All of these issues are discussed on a continental scale. Nevertheless this all leads you to conclude that late Miocene aridification in your study area might be caused by TP uplift, whereas global cooling is made responsible for Central Asian aridification in general. I do not get the point why you can, from comparing the named references, draw the conclusion that locally (in the study region) TP uplift played a larger role than global cooling. Neither do I understand why global cooling should play a role for Interior Asia in total but not for the study region (as you also stress the similarities in the aridification signal earlier on!).

Further on you suggest that the stepwise character of the aridification of the study area is not related to global cooling. This I do not agree on. Also continuous climate forcing can lead to a stepwise response due to nonlinearities and tipping points in the climate system.

How about differences in the aridification signals of different Asian proxy records? Are they similar; is there also a stepwise behavior?

My suggestion: It is not possible to deduce precisely from the available data and literature how important the different effects (land-sea distribution, TP uplift, global cooling,...) were for the aridification in the study region. Hence I suggest to keep the discussion of the different factors, because it is very valuable to state the different influences for the climate of the study region and what is known by now. But, unless you find clearer evidence, you might well just stress your findings and how they compare to other data, that they indicate a weakening of the EASM (as described e.g. in Steinke et al., 2010) and mention possible mechanism without trying to conclude on a “final” reasons for it.

Minor comments

The minor comments regarding language are just to be seen as suggestions, without guarantee for correctness, as I myself am not a native speaker. So please consider them with caution.

Attention: Sorry, the page and line numbering refers to the version with corrections displayed!

Abstract:

P2L13: "...rather humid climate developed.." better: ... rather humid climate existed.." as it is not know from the data whether the climate was wetter or dryer before 11.4 Ma.

P2L15: "...7.4Ma; and an open..." "and" is not necessary.

P2L23: "... dry climate in interior Asian..." better: "... dry climate in the Asian interior..."

Introduction:

P3L2: ", especially for the marked aridification of the Asian..."

P3L16: "... as inferred from the Miocene..." eliminate "the"

P3L29: "recording the effect of TP uplift..." here I would mention also global cooling, as that is what it's all about in your study, to investigate the effects of TP uplift and global cooling on regional climate.

P4L7: "accurately" is not really what it is able to document, just leave the sentence of L6 without that.

P4L21: put back in "the" with "Tibetan Plateau"

Geological and geographical settings:

P5L19: "the" with "the Quaternary" can be eliminated

Materials and methods:

P6L26: eliminate "by"

P6L28: something is missing here: "..., as well as xx (by/from) modern..."

Results:

P7L28: please add a reference for CONISS (might be also better put to the Methods section).

P9L5: "each" instead of "respectively" might be more appropriate

Discussion:

P10L4: in my opinion better to leave "the wind" as it was in the previous manuscript

P12L21: "change in climate" (without "the")

P14L10-15: add citations; "Eurasia has experienced global cooling" sound bit weird. I guess you'd like to point out that Eurasia was influenced by global cooling.

P14L18: weird sentence, please reformulate (e.g. "followed by a long-term but minor cooling trend (4-10Ma)")

P14L20: the complexity of the climate system is not only spatial in nature, maybe just eliminate the term "spatial"

P15L3-6: this is a direct citation from Tang and Ding (2013) but not indicated as such.

P15L8/9: "Greenland's glacial ice"; "... despite a minor cooling trend that occurred...."

P15L10-13: do other studies come to the same conclusion? If so please cite some.

P15L16: "... it should be noted..."

P15L18: "... towards a dry climate in interior Asia" – there was one "s" to many

P15L20: "... Model simulations have paid special attention ..." w.o. "researches" and "been" – otherwise it sounds a bit weird

P15L21: "model simulations" without "the"

P15L26: eliminate "ago"

P15L29: "Asia" w.o. "s"

P16L1: "western and northern China" w.o. "the"

P16L3: "... the land-sea redistribution had a significant impact..."

P16L8: before talking about scenarios you should introduce that you are now going to look at model studies

P16L18-20: this sentence is weird, please reformulate. It is also twice the same meaning (effect of TP on regional climate/regional climatic response to TP uplift)

P16L28: "but" instead of "despite" might be better

P17L6-8: Maybe: "From a combination of the"

Discussion:

Figure captions:

Figure1: a) "location" w.o. "the", b) "major tect..." w.o. "the", c) "precipitation in the Tianshui area" w.o. "between"

Figure4: Line7: "the data is available...."