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Climate of the Past Discussions

Interactive comment on "The sharp decline of East Asian summer monsoon at mid-Holocene indicated by the lake-wetland transition in the Sanjiang Plain, northeastern China" *by* Z. Q. Zhang et al.

Anonymous Referee #2

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"The sharp decline of East Asian summer monsoon at mid-Holocene indicated by the lake-wetland transition in the Sanjiang Plain, northeastern China

prepared by Z. Q. Zhang1, G. P. Wang1,*, X. G. Lv1, H. J. Jia2, Q. H. Xu3

My Comments :

Based on grain size results and LOI data from a mud/peat profile from Sanjiang Plain (NE China) bordered by Amur River, the authors propose that the lake-wetland transi-

tion dated to 4600 yr BP reflects a distinct decline in precipitation related to a decreasing summer monsoon rather than a change in the basin infilling process. A comparison with a facies change from well-developed soils to aeolian sand deposits at 4370±400 yrs observed in a profile near Hunlun Lake in NE Inner Mongolia should support the interpretation.

The topic could be of interest given the remote location, however the paper has some technical and scientific deficiencies, which make that I recommend "the paper should be rejected".

A) Technical problem: - Sample preparation method for grain size analyses (lines 121-125) is odd and not state of the art. Why would you heat a the sample at 550 ° C before measuring individual grain size of the sediment particles? The heating sinters the rock sample and after braking (?) or grinding (?) the measured size classes of sediment particles will no longer reflect the primary grain size distribution. Advise: Never dry a sample, which will be processed for grain size analyses!

B) Geological setting not well defined in the paper and lithological descriptions missing:

Only a few details on the depositional environment are present (mostly in figures only) - e.g. in Fig. 1 the structure of the river basins and their sizes are shown; Figs. 3 and 9 (some duplication) showing a cross-section of an ancient river/channel with a gravelly basal layer topped by two different sediment types. Surprisingly lithological boundaries are very sharp.

To improve the discussion of the data the authors should include a - 1) chapter presenting more details on the geological/sedimentological settings.

- 2) detailed lithological description of the studied cores is needed. It is not clear which criteria the authors used to identify lake deposits? Muds could also have accumulated in river flood plains.

A more detailed look into the geological setting (lines 71 ff) will either strengthen the

proposed interpretation ((i) decline in precipitation is related to a decreasing summer monsoon) or bring up new ideas ((ii) change in the basin infilling process) as highlighted below. The authors failed based on the lithology (a.o., lines 85-89) to conclusively document the favored interpretation.

From Figure 1 I infer that Sanjiang Plain is confined and crossed by perennial and endorheic rivers, which discharge today and in the past into Amur River. Based on field observation or geophysical shallow surface survey data the authors should falsify (or confirm) the following working hypothesis: The proglacial setting documented by the gravel and sand-bedded river facies (Fig. 3) is an setting ideally developing braiding streams which locally still persist today in the large rivers discharging into Amur River. In the given two-dimensional flow regime of Sanjiang Plain the depositional facies will be - depending on surface water discharge and sediment supply from the surrounding mountains (see Ashmere 1991; Parker 1976, a.o.) – controlled by stability dependent channel-scale bed forms. Based on the lithological changes (Fig. 3) the rejected interpretation (ii) seems more realistic because the facies change observed might be due to a change from braiding (gravel and sands) to meandering (mud depositing in the river flood plain) and lateral shifting (peat developed when flooding ceased) of the river because of gradually decreasing slopes in the lower catchment. Dead channels shown in Fig, 1 may represent some ancient, inactive portions of a formerly possibly more southward extended braiding river.

Therefore 1) and 2) are necessary steps and prerequisites for improving the manuscript and helping in understanding sedimentation processes and landscape evolution through time and support either of the interpretations.

3) Moreover grain size and facies changes through time should be related and processes of formation should be assigned correctly. You propose that C2 and C3 grain size ranges reflect offshore and nearshore suspension components (lines 203 -205). Please note: If peat forms no open water body exists in nearest vicinity. Besides precipitation only groundwater is present. Thus the clastic material must have an aeolian

origin. Or the organic –rich sediment is not a peat but a pond deposit.

C) Climatic setting not well elaborated: The paper lacks a comprehensive coverage of the meteorological dynamic controlling the actual and possibly also the past weather features/climate. A reference with synoptic data supporting a SE Monsoon influence at the relative northern latitude (47° N; approx.. S tip of Sachalin Island) is missing. For most reader including myself it will be hard to consider a direct influence of the SE monsoon at 47° N. The annual precipitation pattern resembles much the S Siberian pattern, which is “Westerlies” controlled.

Minor: Fig. 1 typo on y-axes etc.

Interactive comment on Clim. Past Discuss., 10, 4595, 2014.