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Climate of the Past Discussions

Interactive comment on "Changes in C_3/C_4 vegetation in the continental interior of the Central Himalayas associated with monsoonal paleoclimatic changes during the last 600 kyr" *by* M. Mampuku et al.

M. Mampuku et al.

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We appreciate the useful comments and are pleased to note the favorable comments in the opening paragraph.

Reply to Anonymous Referee #1 comment;

1. p875, line 2, the description on C4 and C3 plants isn't exact. To present, we known that tree is owing to C3 plants, but C3 also include wider plants species (shrubs and grasses). Further, the change of non-arboreal pollen (NAP) content is only a reference for relative tree and grass/shrub.

We have changed as follows: The C3 (mainly trees, nearly all shrubs and some grasses) and C4 (grasses) plants can be clearly distinguished by their carbon isotopic compositions (d13C).

2. To interpret the carbon isotope of bulk material in the lake, detail information is need. Isotopic signature of bulk sedimentary organic matter in lake includes complex information from different isotopic sources, as land plants, water plant, algae and others. It is very necessary to distinguish TOC source for interpret carbon isotopic variations in lake sediment. Author utilize the n-alkane L/H ratio and C/N as reference, however, the data in table 2 tell us there is a relationship between d13C values and the C/N, higher d13C are relative to lower C/N. This may imply that high d13C value may involve contribution of water organism. Other, carbon preference index (CPI) of n-alkane may is better indicator than L/H for distinguish TOC source.

As the ref. #1 pointed out, we also recognize that the contribution from autochthonous organic matter is not negligible in the high d13C-value zones. The present low C/N ratios close to 10 seem that the autochthonous input is dominated in the core sediment. However, TOC-TN plot of the RB core (the plot will shown in the revised manuscript) indicates that contribution of inorganic nitrogen (IN) is significant in the sediments (it is estimated about 0.1 wt. %), so conventional C/N ratio (TOC/TN ratio) was lowered by the IN input. Thus, actual C/N ratio (i.e. TOC/TON ratio) of the core is probably high. It is pointed out that conventional C/N ratio sometimes leads to an incorrect interpretation due to abundant IN input (Sampei et al., 1997; Sampei and Matsumoto, 2001; Meyers, 2003). As a result, we conclude that higher plant input is not insignificant even in the high d13C- and low C/N- value zones. It is reported that typical lake algae have low d13C, which are generally indistinguishable from those of C3 plants. Even though input of autochthonous organic matter is predominant, the high d13C values in the core could not be accounted for without the contribution of C4 plants. Thus, we conclude that the changes in the d13C values from the RB core should be attributable to shifts in the proportions of C4 and C3 land plants. We now include the detailed discussion

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on the C/N ratio, and choose to exclude the results of n-alkane analysis in the revised manuscript.

If the extracted n-alkane listed in table 2 were determined for specific compounds (C29 and C31) d13C, it is help to confirm C4/C3 change.

We think it is the best way to confirm C4/C3 vegetation change, but we did not perform such analysis because of sample limitation and technical problem (difficulty for separation from UCM in the fraction).

3. p877, line 7 to 9, author thought the much sand input result in TOC decreasing in sediment sequence (11 m and 90 m). If so, detail discussion is need to do for the cause of fluxing sand dynamics. If water dynamic effect on sand content in sediment, more sand content may mean wetter condition other than dry. In other words, high TOC concentration in sediments can?t be explained as increasing river flow or wetter periods.

The surface sediment up to ca. 11 m in depth is composed of fluvial sand and mud, and these sediments unconformably overlay the lower lacustrine sediment (Sakai et al., 2001). The sand bed around 90 m has been interpreted as an event-deposit caused by a sudden lowering of the lake level for a short period (Sakai et al., 2001). The other sequence of the core between ca. 11 m and 180 m in depth consists of clayey-muddy open lacustrine deposit. We now include these detailed descriptions about lithology of the core in the revised manuscript.

4. TOC, C/N and carbon isotope of modern process such as surface sediments can help to understand paleo-signal in sediments. If it is possible, adding the information from modern in discussion.

We agree, but we cannot get modern data because original lake has already disappeared. Although some small ponds are present in the basin, we think it is hard to evaluate the modern information because the Kathmandu basin is densely populated

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and anthropogenic contamination cannot be avoided.

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Interactive comment on Clim. Past Discuss., 3, 871, 2007.