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Climate of the Past Discussions

Interactive comment on "Three exceptionally strong East-Asian summer monsoon events during glacial conditions in the past 470 kyr" *by* D.-D. Rousseau et al.

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We would like to thank the comments provided by Dr. Guo Zhengtang about our manuscript Cp-2008-0064 on exceptionally strong E Asian summer monsoon events. These are constructive ones, which are raising some key points. One important factor to consider is the period of real activity of the animal, which roughly occurs during spring and summer, the growing season. Terrestrial mollusks are very sensitive to environmental conditions and both temperature and moisture are strong limiting factors.

In the first paragraph, referee states, "under extremely strong winter monsoon the abundance of both kinds of species would be largely reduced. This is correct but must be amended. Warm-moist species are presently leaving in southern China and

for some of them, labeled "orientals" in the very south of China under particularly warm and moist conditions. Therefore assuming that they didn't change their ecological characteristics, they can't survive in dry and cold conditions, even during the period of activity, because they simply are not adapted to such environments. Indeed the ecological niches yields by moist and warm conditions are much more diverse and offer numerous possibilities to terrestrial mollusk to develop. Under cold and arid conditions, the environmental niches are much more reduced in number, and only persist there species adapted to such drastic conditions. This is classical to observe a northward reduction in the number of species, whatever the group concerned. Later referee assumes suitable conditions for snail growth (not too cold with a relative humidity), probably during relatively cold season (mid-Spring?), rather than a strengthened winter monsoon. Indeed this is correct but once more these species are however those able to survive cold conditions associated with frost of the cells. In the same reasoning referee states later that there occurrence "reflect warmer/more moist spring seasons". However these species have a northern modern distribution, and having them in our sequences imply a shift of northern conditions southward, thus more continental ones.

In the second paragraph, the comparison with Lake Baikal is effectively relevant for MIS12. We are looking for northern China evidences for the investigated intervals. We included also the reference to the grains size variations that was released at the time of the submission and support independently our interpretation.

In the third paragraph, referee underlines the complexity of the discussion involving different external factors involved to explain our results. Indeed while snails are poorly migrating animals, having two distant sequences showing similar results led us to seek for independent features allowing to draw a coherent explanation rather than just staying on these results. We also were encouraged to do so by the modeling experiment about the 170 ka event showing the worldwide extent of this variation that our mollusk already recorded. It was then stimulating to try to find some kind of relationship, if any, between the three particular events observed. Concerning the tectonic changes, we

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agree that this is purely hypothetical and could be removed. There are however more and more evidence of the importance of tectonic changes on climate changes.

In the fourth paragraph, referee argues about hiemal half-year warmer than for other glacial times. We agree that this is an interesting proposal that we will include in our revised version, especially the reference to the reduction of snow cover and the relationship to warm winter and spring. This is an important factor that we nevertheless cannot assume from our snails. Only modeling experiments, like the one provided by Qin et al for close period could allow testing our hypotheses. Indeed this is what we are looking for in a next future, permitting to test our proposal.

The figures will be improved accordingly.

D.D. Rousseau on behalf of the co-authors.

Interactive comment on Clim. Past Discuss., 4, 1289, 2008.