

## ***Interactive comment on “Modeling the climatic implications of the Guliya $\delta^{18}\text{O}$ record during the past 130 ka” by D. Xiao et al.***

**Anonymous Referee #1**

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The authors used an intermediate-complexity UVic Earch system climate model to simulate the Guliya surface air temperature (SAT) and analysis the relationship with simulated SST. The authors made a comparison between observed Guliya d18O and simulated Guliya SAT superficially. They concluded that Guliya d18O is an indicator of the late-summer SAT in the NH and the Guliya precipitation may act as a “bridge” linking the SAT and the North Atlantic SST. This is a good attempt to link the atmospheric circulation processes in the northern polar region with that in the third pole region based on ice core record. The results are worthy publishing after major revisions.

In my opinion, there are five major problems in the manuscript: 1. The manuscript body is not fairly organized, no systematical discussion and the interpretations are superficial given the available data. Authors need to present their work with better

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clarity. 2. The analysis on Guliya d18O and simulated SAT is too superficial to confirm the conclusion that d18O indicates the later summer temperature. 3. The title is not consistent with the context. The function of d18O is almost missing and there is no comparison between d18O record and simulations. 4. Figures are not elaborated very much to pull meaningful and more specific conclusions. Many of them are just described by one sentence in the text. There is no logical relationship arrangement of so many figures. 5. The authors said that “demonstrating that the Guliya late-summer precipitation leads the Guliya temperature”. They need more evidences and discussions to confirm it. Furthermore, there are many obvious arbitrarily conclusions in the text.

Some specific comments as follows:

1. Fig 1. The relationship is not robust from present to 60ka, and weaker than that before 60ka. There is no discussion in this part.
2. How do authors calculate correlation between Guliya d18O and simulated monthly SAT? Are linear interpolated data used?
3. Based on Fig 8, it seems that there is no relationship between late summer Guliya SAT and Arctic SATs.
4. Why choose the 23 ka SAT as the test period in section 4? How about other periods?
5. Annual cycles are analyzed several times in the text. Could you demonstrate if they are valid with Guliya d18O?

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