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Comment

## ***Interactive comment on “Significant recent warming over the northern Tibetan Plateau from ice core $\delta^{18}\text{O}$ records” by W. An et al.***

### **Anonymous Referee #2**

Received and published: 29 September 2015

The authors first presented a new  $\delta^{18}\text{O}$  records from an ice core located at Mt Zangser Kangri (ZK), which representing high elevation above 6 km. Then they reconstructed the regional temperate from 195-2008, by using ZK record and another three  $\delta^{18}\text{O}$  records over northern Tibetan Plateau where two records are close to ZK and one is far at the northwestern part. The regional temperature reconstruction shows warming trend from 1970 without displaying any hiatus as observed in recent global mean temperature. This trend pattern from this regional reconstruction also differs from 14 meteorological station data over northern TP (ITNTP). The authors then discussed the possible reasons for this continuous warming trend from the regional reconstruction.

Due to the lack of meteorological stations in high and remote region such as western and northern part of TP, the reconstructions from ice core  $\delta^{18}\text{O}$  can be useful to pro-

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vide the climate information. However, the regional temperature reconstruction is not convincing. The authors may consider to carefully address my comments below.

General comments:

1. The authors applied four d18O records to reconstruct the regional temperature in Fig5a, however, an visual comparison for the d18O value in Fig4 raises doubt on the reconstruction. Global hiatus starts from late 1990s around 1999, to the end of data 2008. In four records only ZK extends to 2008 and there is an obvious drop pattern in this record from 1999 to 2005, one may consider this drop as a hiatus if just observing this individual data. Record from Puruogangri can not contribution to the global hiatus period. Another two records, Muztagata extends to 2002 and Geladaindong extends to 2004, both show increasing trend and eventually compensate the drop shape in ZK record. Therefore at least the continuous warming trend from 1998 to 2004 is an artificial one resulting from combination record of a,b and d. Here I am not against there may be a continuous warming over the Tibetan Plateau, but the regional temperature reconstruction presented by the authors is not convincing.

2. P2710 line 10, the authors state that “The continuous warming trend was also recored in the ITNTP (Fig. 5b)”, but what I observed from Fig. 5b is a similar hiatus roughly after 2000 as seen on global mean in Fig. 5c. I am wondering if the authors put the wrong figure for Fig.5b. Because when authors introduce the ITNTP data in P2705 line 16-17 they state that “Most of the stations used in ITNTP time series were located on the eastern part of the northern TP...”. According to a recent report by Duan and Xiao (2015), there is an warming trend from 1980 to 2013 and especially an accelerated warming trend over the TP from 2008 to 2013. The station data they used covering mostly eastern TP, which may include the 14 stations that used for representing ITNTP. Therefore I suspect that ITNTP should show a continuous warming trend but Fig. 5b really did not tell this.

3. I am not convinced to select isotope sensitivity in section 3.2 as 0.6 and 0.7 as for

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a far away site Muztagata, why do not the authors refer to more nearby stations such as Gerze and Shiquanhe, at least they are latitudinally close, have similar temperature and following the same wind flow to receive the similar water vapour. I think the choice made here dominates the reconstructed temperature. Will be results quite different if one choose isotope sensitivity as 0.33 rather than 0.6?

Specific comments:

1. Last sentence in Abstract, too general conclusion that can be drawn by any studies for TP temperature trend, I suggest the authors present a more concrete conclusion if you regard this work is a valuable contribution to the community.
2. In section 2 for methodology and data the authors do not mention if the d18O record has annual resolution or monthly resolution, but they claim in section 3.1 that the record “showed distinctive seasonal variations”. Do all the d18O records used in this study have monthly resolution? If not, how do they show seasonal variations? Because I am also confused by the correlations in Table 1, are they simultaneous correlations between the d18O and temperature?
3. P2706 line 12 “suggesting more influence of spring temperature on the ZK d18O values”, can you explain why? Do not tell me because the correlation is high.
4. P2707 line 13 “. . . reflect its unique local climate conditions”, what kind of unique climate conditions does Geladaindong have? If the climate condition of this site is so different from the other three, why do you include it to reconstruct the regional temperature? And eventually it seems the contribution from this site compensates the decreasing trend around 2000 and lead to the major conclusion, refer to my general comment 1.
5. P2727, Fig6, 1) better to indicate the ITNTP as well in this figure; 2) colour scale should be adjusted to show more positive correlation since there are no negative correlations and those blue scales are useless. 3) Fig6a and Fig6b are not comparable

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because they do not have the same sample size. Either use the same sample size or add another correlation map for regional reconstruction for the period 1961-2007.

#### Technical corrections

1. P2704 line 5, "(2005 data)", please provide a reference.
2. P2722, Fig1, "Geladaigong" in figure caption and "Geladaindong" marked in the figure, which one is the right spelling? It would be good to have another rectangle to indicate the ITNTP region.
3. P2723, in all the other time evolution figures, year number increases from left to right, but in Fig2 time axis is opposite to the others, better to be consistent.
4. P2724, in Fig 3d, should be "Spring minimum temperature".
5. P2725, Fig4, would be better if indicate " standard values of d18O".
6. P2726, Fig5, did not explain what do those dots mean.
7. P2728, Y-axis scale should fit for the data range, otherwise one has to guess the value for 1951-1960 in Fig7a. In Fig7a, all the decades show two values for 0.6 and 0.7 but not for the decade 1951-1960, why?

#### Reference:

Duan, A., and Z. Xiao, 2015: Does the climate warming hiatus exist over the Tibetan Plateau? *Scientific Reports*, 5, 13711.

Interactive comment on *Clim. Past Discuss.*, 11, 2701, 2015.

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