

Interactive comment on “Distributions of glycerol dialkyl glycerol tetraethers in surface soils of Qinghai–Tibetan Plateau: implications of GDGT-based proxies in cold and dry regions” by S. Ding et al.

S. Ding et al.

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We really appreciate Dr. Zech to provide valuable comments. We are also grateful to his acknowledge for the merits of our manuscript. Since the reviewer 3 pointed out one critical concern about the analytical method, we used tandem LC columns to rerun our samples where a series of new brGDGTs, namely 6-methyl brGDGTs, were identified (see Response to reviewer 3 for details). So we finished the section of result and discussion according to the new data, and thus made lots of changes in the revised manuscript. And some problems from Dr. Zech no longer exist. Here, we answer

C1934

those comments point by point.

General comments: The manuscript of Ding et al. provides new, interesting GDGT data from the Qinghai- Tibetan Plateau. It is well structured and written (but I am not a native speaker and didn't focus on language), and appropriate references are cited. I recommend publication in BG, although I think more statistical analyses could possibly improve the manuscript.

1) The authors show that the MAP (mean annual precipitation) is better correlated with MBT and CBT (R^2 0.5) than the MAT (mean annual temperature, R^2 0.36, page 494). Then in the next step, when they present a recalibration for all Chinese soils, they do this ONLY for MAT. Why not also for MAP? Why not for an Aridity Index? - Although the isoprenoid GDGTs are measured as well, they are not fully included in the statistical analyses and discussion. The Ri/b and BIT have been shown to correlate with environmental conditions (aridity), so why not testing respective correlations and including the isoprenoid GDGTs and an Aridity Index in the statistical analyses? Response: after we successfully separated 5-methyl and 6-methyl brGDGTs, we found that precipitation is no longer important on MBT5ME. Soil pH is the most important factor on brGDGTs' distributions, followed by MAT, while MAP is the least important one. This result is consistent with recent finding of de Jonge et al. (2014) who also separated 5-methyl and 6-methyl brGDGTs. Given these facts, we do not pay much attention to MAP.

2) Specific suggestions: The molecular structures of the GDGTs have already often been published in manuscripts. I would put Fig. 1 in the appendix. Response: It is true the structures of traditional GDGTs have been shown in many papers. However, we identified several 6-methyl brGDGTs, which were not reported in most early studies, so we still show the chemical structures of GDGTs.

Figures 6 and 7 are not really necessary. As all the seasonal parameters are not improving the correlations much, I would keep only Fig 6a, 7a. I would also delete fig.8b. Response: This is a good comment. In the revised manuscript, we deleted all

C1935

figures about seasonal parameters, but gave brief discussion in the section 3.3.3

Minor specific suggestions: On page 482, line 4, you may want to write " : : : are NOVEL proxies", or " : : : are POTENTIALLY useful proxies". There are many remaining unknowns and uncertainties related to GDGTs. Response: we accepted this suggestion and make change in the revised manuscript.

On page 484, lines 22 and 23, check your reference to the equations. Response: We checked and made correction.

In line 24: I think the extended dataset are 278 soils? But n in the following equations is only 176? Maybe clarify this in the text (I am wondering whether it is statistically justified to exclude the missing samples and whether this causes a bias in the calibration!?) Response: they have total 278 samples, but some has no detectable GDGTs, reducing number to 176.

On page 485, double check equation 5 (MAT on the right should probably be MBT?) Response: we checked and confirm it.

In line 7, you might want to write " : : : the MBT-CBT proxy has been INCREASINGLY used", not SUCCESSFULLY. Response: we accepted this suggestion and made change in the revised manuscript.

On page 496, line 14: "The reason : : : IS ..." sounds too confident for my taste. Better" : : : MIGHT BE : : :"? Response: we changed "is" into "might be" in the revised m

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