

Dear Referee,

Thank you for your useful comments and suggestions on our manuscript. We have modified the manuscript accordingly, and detailed corrections are listed below point by point:

**1. English writing must be improved. Specially, appropriate singular and plural should be use correctly. A native English speaker is suggested to help improve it.**

A professional helps us for revising the WHOLE manuscript carefully and trying to avoid any grammar or syntax error. We believe that the language is now acceptable for the publication.

**2. The analysis does not include slope and aspect as factors in topographic factor. In conclusion it does not make sense that the authors highlight the importance of mechanisms of slope and aspect in explaining AB alpine grassland.**

Unfortunately, the low accuracy of SLOPE and ASPECT cannot be used as environmental factors. Even so, the micro-geomorphic factors should be considered when undertaking further research. However, we put emphasis up on the importance of SLOPE and ASPECT without the special analysis in conclusion. So we have revised the sentence.

**3. In conclusion, I require the authors to add value of the CART and GAM model to screen factors and predict AGB patterns.**

We had added the threshold value (CP) in results.

#### SPECIFIC COMMENTS

**1. “Sometimes the fitting results would be contrary to common sense, but it does not prevent us from finding the most effective environmental factors, which is the essence of this method” in page 14569 line 17-19. Why you are so superstitious the method if it cannot reflect the common sense!**

In page 14569 lines 17-19, the expression style was very absolute, so the sentence has been revised.

**2. In the text, some description such as “AGB patterns”, “the abundance of AGB”, “the trend of AGB” and “the distribution of AGB” might be similar meaning. Can you use consistent concept for them.**

The same term-“the abundance of AGB” has been used consistently throughout the manuscript.

## TECHNICAL CORRECTIONS

**1. Page 1 Line 4: “Alpine grassland here is an important component of the global carbon cycle”. Grassland is an ecosystem. It is not appropriate to say it is a component of C cycle.**

The sentence has been revised according to the suggestion of referee.

**2. Page 14563 Line 20-27: Description of species composition in alpine meadow, *Polygonum viviparium* is not common in the most of meadow.**

The *Polygonum viviparium* is not common in the most of meadow, so we omitted the proper noun in our description of species composition.

**3. Page 14566 Line 14-22: move this method section of CART to method section.**

We have adjusted the description of CART method in **Material and methods**.

**4. Page 14566 Line 23: What is CP? Please clarify CP in the method section.**

*cp* is complexity parameter. Any split that does not decrease the overall lack of fit by a factor of *cp* is not attempted. For instance, with ANOVAs splitting, this means that the overall R-squared must increase by *cp* at each step. The main role of this parameter is to save computing time by pruning off splits that are obviously not worthwhile. Essentially, the user informs the program that any split which does not improve the fit by *cp* will likely be pruned off by cross-validation, and that hence the program need not pursue it. (Package ‘*rpart*’, R Development Core Team: R: A language and environment for statistical computing, R Foundation for Statistical Computing, Vienna, Austria, ISBN 3-900051-07-0, <http://www.R-project.org/>, 2011.)

**5. Many places confound singular and plural noun. For example, datum and data, index and indices, maximum and maxima as well.**

The grammar has been revised according to the suggestion of referee.

### Figures:

**Fig.1. The description in figure title and legend is not consistent. The black solid circles C6187 represent the samples collected in alpine steppe (not steppe but meadow), and the black solid triangles represent the samples collected in alpine meadow (not meadow but steppe).**

The error was corrected in the title of Fig 1.

**Fig.3. This figure is not clear.**

The Fig.3 has been adjusted, it is shown in end of manuscript.

**Fig.4. and Fig. 5. what are the lower panels of these figures stand for? You should describe clearly in the title of figure.**

We have described the lower panels carefully in the titles of Fig.4 and Fig.5.

**Fig.6. Why use density but not frequency of the data? What does density mean? How do you calculate it?**

The distance of group is reduced with increased the number of groups, the line of frequency distribution is close to a smooth curve, then the smooth curve is overall density curve. It can be described by function  $y = f(x)$ .

Normally distribution:

If the random variable  $X$ , whose density is  $f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$   $-\infty - +\infty, \sigma > 0$

We hold that  $X$  obeys normally distribution of  $\mu$  and  $\sigma$ , and it was marked:

$$X \sim N(\mu, \sigma^2).$$

The characteristic of normally density curve:

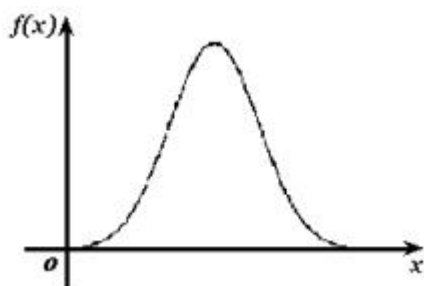
1) If  $x=\mu$  is symmetry, where  $f(\mu+x)=f(\mu-x)$ ;

2) If  $x=\mu$ ,  $f(x)$  reach to maximum of  $\frac{1}{\sqrt{2\pi}\sigma}$ ;

3) If  $x \rightarrow \pm\infty$ ,  $f(x)$  is tend to zero;

4) The area between of curve and x-axis is 1.

Thus, the description of the figure of  $f(x)$  is shown below:



It was vivid called as “Bell”.

**Fig.7. and Fig.8. what are the y-axis standing for? Are they biomass or biomass change**

**amplitude? Please clarify in Materials and Methods section and in the figure title.**

The y-axis represents the abundance of aboveground biomass. We have interpreted in Materials and Methods section and Figure title. We also see the Table1.

Thank you,

Yours,

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