Dear Professor Jia,

Thank you very much for sending us the final decision on our manuscript. We have revised the manuscript per your comments and suggestions. We hope that you will find the new version of our MS is now readily suitable for publication in Biogeoscience. We addressed all queries sequentially as detailed below.

Question 1

As for the detection limit of CO_2 measurement. First of all, please simply provide the information about the instrument you used for CO_2 measurement (such as brand name of the instrument). Secondly, please clearly state the detection limit of this instrument (one may not understand what does "0.1 mm of released CO_2 " mean). Finally, please clearly state the HEADSAPCE VOLUME of the vial in which 10 gram soil was placed for acidification. Furthermore, CO_2 of any origin (calcium carbonate or urea) can be used for generating standard curve. This is not the key point.

Reply:

Soil inorganic carbon content was measured by gasometric method (Page, 1982). Briefly, 10 g air-dried soils (<1-mm) were mixed with 8 ml HCl (2 M) in a 50-ml sealed flask at room temperature. Then the CO_2 pressure was recorded by barometers and was converted into soil carbonate content based on the standard curve. This text has been added to the revised manuscript.

Reference

Page, A.L., 1982. Methods of soil analysis. Part 2. Chemical and microbiological

properties. American Society of Agronomy, Soil Science Society of America, pp, 182-187.

Question 2

(2) L140. Rephrased as "Soil pHBC was measured by titration using HNO3 because the nitrate anion is widely thought to interacts with soil materials to a much less extent than other known acid anions.

Reply:

Some minor edits to the text: 'Soil pHBC was measured by titration using HNO₃ because the nitrate anion is widely thought to interact with soil materials to a lesser extent than other acid anions.'

Question 3

(3) L146. Pls provide the instrument information for pH measurement.

Reply:

The instrument information for pH measurement was provided in the revised manuscript.

Question 4

(4) L212. Please give the absolute concentration like ppm rather than simply saying detection limit.

Reply:

The detection limit of the instrument in our study is 1 ppm of CO_2 . This information has been added to the revised manuscript.

Question 5

(5) Figure S1. It is certainly not accepted that part of China map is overlapped with MAP and temperature inset. The entire territory of China needs to be displayed.

Reply:

Thank you very much. The inset in figure S1 was deleted and a new figure S2 was added to show the changes of mean annual precipitation (MAP) and temperature (MAT) along the longitude gradient in the revised manuscript.

Question 6

(6) Figure 1 legend is still confusing. First of all, there is filled square and empty square. Pls specify what does this meant. I guess the empty square means soil pH for natural control soil, while the filled square means pH values of soils after 16 mmol acid amendment. Then the dashed line represents the means of pH values of soil treated with 16 mmol acid? If so, the figure legend can be rephrased as "Acidification of grassland soils upon acid addition (16 mmol H+ kg-1 soil added) to carbonate containing soils (squares) and the non-carbonate containing soils (circles) collected from the 3600 km-long transect. The empty symbol denotes background soil pH as control, while the filled symbol represents soil pH value after acidification. Mean changes in pH values for both carbonate-containing and non-carbonate containing

soils are shown in the inset. The solid line and dashed line represent the mean pH values of controls and acid-treated soils across the transect, respectively."

Reply:

We agree with you. The figure legend was revised in the revised manuscript as you suggested.

Your sincerely,

Wentao Luo