Dear reviewer,

Thank you very much for your comments with regard to our manuscript (**bg-2014-523)**. The comments from the reviewer were very helpful and we agree that the previous version needed revision. We take all of these comments into account in preparing the revised manuscript. We believe that manuscript has been improved satisfactorily and hope it will be accepted for publication in **Biogeosciences**.

We thank again the reviewer for the helpful comments. Should you require any further information, please do not hesitate to ask.

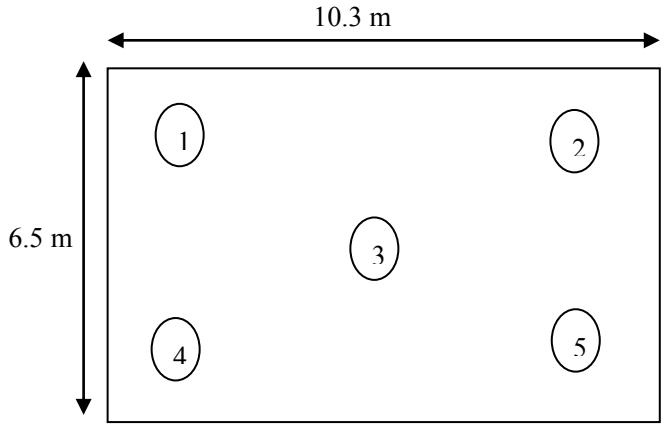
To the Comments of Reviewer #1

QI-1: Most critical point of this manuscript is the number of measurement points: It is one for one plot, and only three plots were measured. As we know, soil respiration has quite large special variation. Thus, I don't think this result shows enough evidence of author's conclusion because special variation could be larger than seasonal variation. One of the solutions of this problem is to show that the special variation of soil respiration on this plot is enough small by doing field campaigns in the future.

R: We totally agree with the reviewer's comments that soil respiration has quite large spatial variation especially in the sites with complex terrain (causing the redistribution of SOC in the in the landscape) and different vegetation types (Banning et al, 2008, SBB; Sheng et al, 2010, GCB). In our studies, however, the spatial variation of SOC mineralization rate is enough small. This is because there was no any vegetation or input of (aboveground and belowground)

litter in our plots since 1984 (absolute fallow), and the spatial distribution of SOC was relatively homogeneous due to the soil derived aeolian deposit loess and flat terrain. Additionally, five PVC collars were installed in our plots (attached pictures), and SOC mineralization rate was measured in the five PVC collars for investigating the spatial variation in summer (hot and rainy) and winter (cool and dry). On July 11, 2008 and November 18, 2008 (representing summer and winter), for instance the results presented herein clearly showed that the spatial variation of SOC mineralization rate is enough small, with CV was only 4% and 5% in summer and winter, respectively (Table. 1).

Due to the small areas of our plots (66.95 m^2) and saving time (needing 5 minutes for measuring SOC mineralization rate in a given PVC collar), thus during the period of 2008 to 2013, the PVC collar located in the middle of the plot was used for measuring SOC mineralization rate, because the SOC mineralization rate in the middle of the plot was most close to the mean SOC mineralization rate (Table 1).



Attached pictures. 1 The location of PVC collar in our plots

Table. 1 SOC mineralization rate in the five collars in our plots in summer and winter.

	SOC mineralization rate					
Dates	Collar 1	Collar 2	Collar 3	Collar 4	Collar 5	Mean value
Summer	1.55±0.11	1.60±0.20	1.58±0.21	1.49±0.07	1.65±0.18	1.57±0.06
Winter	0.29±0.01	0.30±0.02	0.31±0.01	0.32±0.02	0.33±0.02	0.31±0.02

QI-2: The other point is the meaning of 'soil organic carbon mineralization' in this manuscript. Normally, mineralization of SOC doesn't contain root respiration, but it in the manuscript might have. It contains the mineralization in the soil (it means not through the gas, for example leaching and so on), but it in the manuscript doesn't. Also, usually SOC doesn't contain litter, but it is

R: At the present study, SOC mineralization rate did not include root respiration due to the bare soil was established and is always in a state of fallow since June 1984. Our oversimplified information in the **2.2** sections made the reviewer misunderstand the meaning of SOC mineralization rate in our studies. Based on the comments, the **2.2 Experimental design and management sections** were rewrote and revised, for example "The bare fallow soil used in the present studies is one of the long-term experiments, which was established in 1984. The bare plot is always in a state of fallow since June 1984 after the harvesting of winter wheat (*Triticum aestivum* L. 'Chang Wu 131 series'), and any living weed will be artificially removed timely. **Therefore, there were no any vegetation and also no any inputs of aboveground and belowground litter, then SOC mineralization rates in the bare fallow soil does not include root respiration and litter mineralization and decomposition.**.

QI-3: P1454L2 SOC and WFPS should be defined

R: Yes, SOC and WFPS was defined in this part, for instance "Temperature sensitivity of soil organic carbon (SOC) mineralization (i.e. Q_{10}) determines how strong the feedback from global warming may be on the atmospheric CO_2 concentration, thus understanding the factors influencing the interannual variation in Q_{10} is important to accurately estimate the local soil carbon cycle" , "annual soil moisture content ranged from 38.6 to 50.7% soil water-filled pore space (WFPS), with mean value of 43.8% WFPS and CV of 11%, which were mainly affected by the frequency and distribution of precipitation".

QI-4: P1454 L2 The definition of Q10 is unclear. In the first line, it is defined as 'temperature sensitivity of SOC mineralization' but after described as 'Q10 of SOC'

R: We take the comment. In the text, Q_{10} is redefined as "Temperature sensitivity of soil organic carbon (SOC) mineralization (hereafter 'Q_{10}')", after then Q_{10} means temperature sensitivity of SOC mineralization in our manuscripts.

QI-5: P1454L12 not always 'negative'quadratic correlation P1455 L25 why the duration is 2004-2010 and not 2008-2013?

R: SOC mineralization rate was not always negative quadratic related with soil moisture at seasonal scale (Table 2), whereas annual Q_{10} showed a negative quadratic correlation with annual soil moisture at annual scale (Fig. 3b). We did not describe the response of SOC mineralization rate to soil moisture at seasonal scale due to objective of the studies for

understanding the effect of soil moisture on interannual variation in Q_{10} in the abstract sections.

Additionally, with the results of Xiao et al, 2014 to prove the conclusion that soil moisture availability was controlled mainly by uneven rainfall distribution.

QI-6: P1456L10 SOM: I guess SOC. (If it is really SOM, need to be defined) P1456L15 (3)analyze the relationship. . .. I don't think it is the object of this study, it is just authors did. The object is the aim of study, not process for the aim.

R: Yes, SOM was replaced by SOC, and (3) analyze the relationships among precipitation, soil moisture, and Q_{10} was deleted from our manuscripts.

QI-7: P1457L11-15 I don't think this part is needed as it is not used in the experiment.

R: Yes, the relative information for the purpose of the long-term experiment in the **2.2 Experimental design and management sections** was deleted. Additionally, **2.2 sections** were rewrote and revised due to the oversimplified information. Detailed information sees the replies for QI-2.