Biogeosciences Discuss.,
doi:10.5194/bg-2017-66-AC2, 2017

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Seasonal and interannual dynamics of soil microbial biomass and available nitrogen in an alpine meadow in the eastern part of Qinghai-Tibet Plateau, China" *by* Bo Xu et al.

Bo Xu et al.

834677515@qq.com

Received and published: 22 May 2017

The paper deals with the seasonal and interannual dynamics of soil microbial biomass and available nitrogen in an alpine meadow in China. The subject is interesting but the poor english sometime let the comprehension of the text very difficult. Response: We thank referee for the helpful comments. After discussing with co-authors, we thoroughly revised the manuscript and listed in supplement. Yes, the revised manuscript will be send to a professional language editing company for the language modification during the final revised period. I suggest some changes but I strongly recommend to check the english language through the assistance of a mother tongue. Moreover the paper lacks of some information such as the measurement of the snowpack depth,

Printer-friendly version

Discussion paper

the estimation of the depth of the active layer and the criteria that have been used to determine the growing season lenght. Response: We are sorry for the lacks of detail information on the snowpack during the study years, and we only had some datum on snowpack depth during the non-growing season in 2012-2013 (Page 5 lines 2-4). The definition of growing season were added to the revised manuscript, i.e., "the growing season (i.e., during early May to late October according to the plant phenology observation in the alpine meadow from 2011 to 2013)" and "The mean temperature of the growing season was calculated by the mean daily temperatures from 1th May to 31th October, and that of the non-growing season was calculated by the mean daily temperatures from 1th November to 30th April. " (Page 5 lines 15-16 and Page 7 lines 8-10). Some specific points are listed below: Pag 1: lines 14/15: Did you collect topsoil samples? Please specify better line 16: add in (MBN) after and N. Response: Yes, "Soil" was been changed to "Topsoil", and "(MBN)" was been added in the revised manuscript (Page 1 lines 15-16). Pag 2: line 12: With the term frozen soils do you mean permafrost soils? Response: No, the "frozen soils" here refers to the seasonal frozen soils. Pag 3: line 6: When you mention alpine ecosystems do you mean seasonally snow cover ecosystems? Response: Yes, "alpine ecosystems" in our study refers to the seasonally snow covered ecosystems. Pag 4: Lines 6: again, do you refer here to subnival microbial activity during winter? Line 9: correct seasnonal into seasonal. Response: Yes, "microbial activity" here refers to the subnival microbial activity during winter, and the "seasnonal" was corrected to "seasonal" in the revised manuscript. Pag 5: Line 4: When you mention frost-free periods, do you refer to air temperature? What is the mean snow depth in the area? Response: Yes, "frost-free periods" in our study refer to air temperatures. Some information on snow cover in the study area was added, i.e., "persistent snow cover usually occurs from late December to early April, and the mean snow depth is 16.58 cm in the study area (Xu, unpublished data, collected in 2012, 2013)" (Page 5 lines 12-14). Lines 9-10: Please add also the soil classification according to the Soil Taxonomy Lines 12-13: Do you work in a catena of soils? What do you mean with the terms top, middle and bottom? Line 14:

Printer-friendly version

Discussion paper

Does this soil horizon is a A horizon? Response: The soil classification of the area was added, i.e. “mountain dark brown soil” (Page 6 lines 2). Yes, serial soil samples were collected, and each sampling site was adjacent to each other at each sampling time. The terms of “top, middle and bottom” mean the locations of sampling sites, and we have revised this sentence as “Considering the soil spatial heterogeneity, three adjacent sites approximately 100 m apart (centered at 32°59âĂš N, 103°40âĂš E, 3980 m a.s.l.) were sampled, namely located at the upper, middle, and lower part of the alpine meadow” (Page 6 lines 5-7). Yes, the 0-20 cm horizon in our study is the A horizon. Pag 6: Line 1: In winter did you collect the soil samples under the snowpack? Lines 12-14: here you mention the chloroform fumigation technique. Why did you describe this method later at pag7 (lines 7-15)? Response: Yes, the alpine meadow was snow covered in deep winter, and the snow was swept before soil sample collecting. Because the chloroform fumigation treatment was also used for the determination of TDN. We rewrote this section, and the “3.4 Soil water content, microbial and nutrient analyses” section was divided into two sections, i.e., “3.4 Soil water content and nutrient analyses” and “3.5 Soil microbial biomass and community analyses” (Page 7 line 11 to page 9 line 5). Pag 8: Lines 1-4: Did you fumigate also some soil samples for the determination of extractable DOC in the measurement of the microbial C? Lines 10-11: What is the definition of growing season? Did you consider the air temperature to define this period? Did you consider the soil temperature? Response: No, the fumigate treatment did not use for the determination of extractable DOC in the measurement of the microbial C. The definition of the growing season is according to the plant phenology observation in the alpine meadow from 2011 to 2013, which indicated that the growing season is during May to October (Page 5 lines 15-16 and Page 7 lines 8-10). Lines 12-13: Sorry I don’t understand this sentence. Response: This sentence (Lines 12-13) was revised as “Pearson correlation analysis was then performed to analyze the correlation of the MBC with SWC and of that with the DOC during the non-growing and growing seasons.” (Page 10 lines 14-16). Pag 9: Line 2: Add respectively after 2012-2013 Lines 2-3: how do you define a freeze/thaw

cycle event? Response: Yes, “respectively” was added after 2012-2013. Actually, we did not measure the frequencies of freeze-thaw cycle events, and we inferred numbers of the freeze-thaw cycle event according to the mean soil temperature (0 °C or thereabout). It is unreasonable to define a freeze-thaw cycle event just according to soil temperature. So, this result was deleted in the revised manuscript. Pag 10: Line 18: What do you mean from one another? Response: “one another” was revised as “each other” (Page 13 line 5). Pag 11: Lines 3-4: I don’t understand this sentence, in particular“but that significantly lower: : :..” Response: This sentence was revised as “The DOC contents during the non-growing season in 2011–2012 (174.27 mg kg−1 ± 32.59 mg kg−1) and growing season in 2012–2013 (170.85 mg kg−1 ± 41.19 mg kg−1) had no significant differences ($p > 0.05$), but those were significantly lower than that in other seasons ($p < 0.05$; Fig. 6B).” (Page 13 lines 7-9). Pag 12: Line 11: Do you think is it necessary to specify“the beginning of the early non-growing season”? It’s not possible to mention also the beginning of the early non-growing season? Response: Yes, we thought it was necessary to specify and mention “the beginning of the early non-growing season”, because MBC contents showed different dynamics during different periods of the non-growing season, i.e., MBC contents increased in early non-growing season, but decreased in deeply cold period, and then increased in the late non-growing season. Pag 13: Lines 16: Do you mean the plant community? Please specify better this concept. Response: Yes, the community productivity was mean the plant community productivity, and “community productivity” was been revised as “plant community productivity” (Page 16 lines 6-7). Pag 14: Line 15: seasnon change into season Lines 17-18: Sorry but this sentence is not clear. What do you mean with “increasing process of NH4-N”? Response: Yes, “seasnon” was been changed into “season” in the revised manuscript. Actually, the “increasing process of NH4+–N” was mean “increasing trend of NH4+–N”, and we revised this sentence as “An obviously increasing trend of NH4+–N was found during the early soil thaw” (Page 17 line 8). Pag 15: Lines 2-3: change thawing with melting. Moreover, do you have data about snow chemisty in the area? Response: Yes, “thawing” was

changed into “melting”. Sorry, we did not have the data on snow chemistry in the study area. Lines 4: Preferred in comparisono to what? NO3? Response: Yes, alpine plant preferred NH4+–N compared to NO3−–N and DON. Line 9: During the middle growing season do you expect a high plant uptake which cause the reduction of soil inorganic N? Response: Yes, we do agree with that a high plant uptake cause the reduction of soil inorganic N. Lines 10-11: Late in the growing season you observed a reduction in the soil inorganic N. But with the reduction of plant uptake you did not expect an opposite trend? Response: Actually, some late-flowering plants such as Gentiana sino-ornata usually dominate the late growing season, and they need to uptake relatively high available N for growing. We found that the DON was an effective supplement of the available N pool during the late growing season. Pag 16: Lines 7-8: Warmer and drier than 2012-2013? Moreover also a greater number of freeze/thaw cycles than 2012-2013? Response: Yes, the non-growing season in 2011-2012 was warmer and drier than that in 2012-2013. As we did not measure the frequencies of freeze-thaw cycle events, some similar literatures were cited in the revised manuscript. This sentence was revised as “Notably, a warmer and drier non-growing season was observed in 2011–2012 than that in 2012–2013, which might accompanied with more frequent freeze-thaw cycles during the early period of this season (Mellander et al., 2007; Henry, 2008)” (Page 18 lines 16-18). Is the greater number of freeze/thaw cycles recorded in the drier season 2011-2012 related also to a thinner snowpack with a little insulation effect? Response: Yes, we do agree with that the greater number of freeze-thaw cycles in the drier season may also related to a thinner snowpack with a little insulation effect. Unfortunately, we did not have detailed information on the snowpack during the study year.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/bg-2017-66/bg-2017-66-AC2-supplement.pdf

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2017-66, 2017.