

## ***Interactive comment on “Differences in spatial and temporal root lifespan of temperate steppes across Inner Mongolia grasslands” by W.-M. Bai et al.***

**W.-M. Bai et al.**

whzhang@ibcas.ac.cn

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Anonymous Referee #2

The scientific significance of the ms is high as data about root lifespan in different ecosystems and for different functional plant groups are urgently needed for understanding and modelling of belowground C –cycle, where the uncertainties of estimations are the highest. The ms presents valuable data of root longevity in three types of temperate steppe. The major concern is that text of the ms is not focused and clear, it is quite hard to follow, first there are too many repetitive and general "empty" sentences (see specific comments). The language needs correction starting from typing errors

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to repetitions within one sentence: for example Page 20001-20002, lines 28-3:"In addition, several studies have suggested that lifespan of roots produced in different seasons may differ significantly because roots generated in different seasons can have There are many mistakes in the language of the paper (as the previous reviewer also pointed out). varying functions (López et al: : . There are too many such sentences, it makes hard to follow the message. Moreover I suspect that some citations are not used correctly.

We have carefully revised the manuscript by polishing and editing language. We checked the references cited in the manuscript, and confirmed they are correctly cited.

Specific comments: The introduction contains repetitive sentences, for example page 20000 line 21, 25, page 20001, line 7 all are reformulations of the statement that roots and their turnover (or longevity) are the link between plant and soil organic C. Or those two sentences on page 20001, lines 2-6 mean almost the same and are repetitive. Please be more focused in sense of text content.

We revised the sentences by deleting those repetitive ones as suggested by the reviewer.

Page 20001, line 13, delete Dali from reference McCormack and Guo, 2014, Dali is the first name. Why not to use km<sup>2</sup> instead of hm<sup>2</sup>, it would make 58500 km<sup>2</sup> instead of 5.85 x 10<sup>6</sup> hm<sup>2</sup>. The aim of the work is not clearly formulated. Please do that!

We corrected the reference, changed the unit of hm<sup>2</sup> to ha. We revised the aim of the work as suggested by the reviewer (line 86).

Page 20008, lines 7-9: what you mean with "they both were significantly higher", the sentence is confusing, please reword.

We re-worded the sentence (lines 262-263).

Page 20008, lines 23-24: S. grandis occurs twice and S. krylovi is missing.

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We corrected this error (line 277).

Page 20012, line 6: This statement is not true in this context! I cannot get that publication that fast to control your statement, but check it definitely over, I think Eissenstat and Yanai (1997) said that smaller biomass allocation (can be converted to C) to fine root system associates with their higher turnover rate, and usually there has been also measured mass fluxes. In your studies it has not measured, so we do not know anything about estimates of C flux, we only know that the turnover rate is higher in S. krylovi type grasslands. It has a different meaning what you say, in your context, I understand, that decreased C allocation into roots causes' shorter lifespan, and I wonder that you have used exactly the same sentence also in Bai et al, 2008 and 2010, but you have not measured the fine root biomass, so we cannot assess the C flux, but in this ms you already cite yourself next to Eissenstat and Yanai. Once more, in this study you have not measured C allocation, you have measured root longevity - less living roots may account for as big C allocation by higher turnover rate as longer living root systems. It needs biomass estimation.

We included the analyses of correlation between root longevity and BNPP/ANPP in the revised manuscript by re-plotting Figure 5 as suggested by the reviewer. The results of stepwise multiple linear regression reveal that BNPP/ANPP and contents of soluble sugars in roots can account for 66.13% variation of root longevity. We included these information in the revised manuscript (Fig. 5 and lines 310-316).

Page 20014, lines 2-4, I am not convinced that soluble sugars in roots control their roots lifespan, I think that concentration is indicator of differences in physiology, and higher soluble sugar concentration is related to longer lifespan of roots, but not controlling.

We revised the statement by changing the sentence to "Given that the root lifespans in the three types of grasslands were related to the contents of soluble sugars in roots, ..." (lines 423-424).

Table 1, column 4: I think you mean Inorganic N content instead of "concentration"? In

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text you also refer to N content in Table 1 (page 20012, line 1.)

Yes, we changed the "concentration" to "content".

In Fig 5, the unit for Inorg N content is mm kg-1??? Please use consistently the same term for the same trait.

We fixed the typo.

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