

## ***Interactive comment on “As different as day and night: evidence from root lifespan” by W. Bai et al.***

### **Anonymous Referee #1**

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The labor intensiveness in studying seasonal root dynamics is widely known among researchers. Mostly because of this labor intensiveness, there is still a void of data related to the responses of plant roots to climatic change. Studies like this one are clearly needed.

This study provided valuable data and found somewhat surprising results, i.e., root longevity increased when the grassland ecosystem was warmed during the day not during the night. The authors thought that the indirect effect of warming in the form of reduced soil moisture enhanced plant C allocation to roots which supported longer root lifespan. This line of thought was supported by the evidence of increased root nonstructural carbohydrates under day warming only. This conclusion implies that C allocation might be a key mechanism mediating the response of the semi-arid grassland ecosystem to climate change, especially the interplay of temperature and precipitation.

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The experimental design is largely sound, particularly attractive is the use of six field replicates instead of the common approach of using three or four replicates. Multi-year dataset in this study adds strengths to their results. But some discussion about inter-annual variability would be a better addition to the paper.

The writing of the paper clearly needs improvements. Some suggestions are given here:

Page 1, The title is not as informative, use this one: Root lifespan under day and night warming?

Page 2, Line 4: This is only a prediction, has not been proved true or not. Suggestion: “which is predicted to occur” Line 9: the word “diurnal” here is somewhat confusing, maybe “continuous”? This applies to the entire text. Line 10-11: This sentence needs a re-write. Line 14: “growing seasons of 2007-2009” is unclear. How many growing seasons? three growing seasons from 2007 to 2009? Line 16-23: Rewrite this part. Line 27: change “ecosystem” to “ecosystems”

Page 3, Line 10: delete “of plants” Line 13-14: “Day and night warming would stimulate photosynthesis and respiration, respectively.” The meaning of this sentence is unclear. Line 21-22: “the terrestrial ecosystem”? or simply “terrestrial ecosystems”?

This is too much work. I have to stop here.

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Interactive comment on Biogeosciences Discuss., 8, 10459, 2011.

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