

Interactive comment on “Non-additive effect of day and night warming on soil respiration in a temperate steppe” by J. Xia et al.

J. Xia et al.

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General Comments

The manuscript describes results of a comprehensive warming study in a grassland, looking specifically at the differential effects of daytime versus nighttime warming. Critically, the authors consider ecosystem responses in this work, rather than just soil respiration, which adds to the quality of these results. Day vs. night warming studies have been conducted in a range of ecosystems before, so this is not ground breaking, but the results in the way they were analysed (additive day and nighttime effects vs. diurnal warming) very instructive, and this study merits publication in Biogeosciences. Authors thank Referee #2 for the positive comments on our manuscript.

C812

The language of the manuscript is generally good or even very good. However, it should be proof-read by a native speaker to straighten out some remaining sentence constructions that are not entirely clear, but this should be a small issue only. There are a number of further points I list below, that need to be addressed before this manuscript should be accepted, but again I think that these amount to minor revision only. We have asked an Australian scientist to proof-read and polish the English writing for this revised version.

Specific Comments

4389, 17 “3 × 4 m”, not “3 × 4 m²”. We have replaced “3 × 4 m²” by “3 × 4 m” in the revised version (Line 109).

4390, 19 I think that “GEE” is not a meaningful term, and GPP (Gross Primary Productivity) is more appropriate. An exchange (as in NEE) is necessarily a net flux, as it constitutes opposing flux directions, while here you refer to only C uptake, which is GPP. In order to keep consistent with a previous paper in the same study (Wan et al. 2009), here we use “GEE” but not “GPP”. In the revised version, we have defined “GEE” clear (Line 157-159).

4390, 21 and 23: As above, the units are always m, not m³ or m²; if you stated the actual volume or area instead of dimensions, the units you propose would be correct. We have replaced “m³” and “m²” by “m” in the revised version (Line 139-141).

4391, 13: Give the periods over which you integrated GPP. GEP were calculated by multiplying daily integrated values of GEE. We have addressed it clearly in the revised version (Line 157-159).

4391, 18: “S. krylovii” (lower case k) We have replaced “K” by “k” in “S. Krylovii” across the manuscript.

4393, 6-9: The bars in Fig. 5 are slightly confusing; you show increases in GEP as positive values, which can be confusing as increases in uptake are conventionally

C813

shown as negative fluxes of C, while net losses of C are shown as positive values. You should clarify which convention you follow in the diagrams and keep the direction of the flux consistent (For example in Fig. 2, positive fluxes are gross respiration from soil). Further, the relative change in GEP by all three warming treatments is more than 5. Thanks for the reviewer's valuable suggestions. In this study, we considered C uptake (GEE) to be negative while C release (ER and SR) to be positive. Thus, GEE in this study was equal $NEE+ER$. We have addressed this issue clearly in the revised version (Line 156-157).

4395, 8-10: Increase in soil T has been shown to increase GPP? I'm not aware of this being the case, and the citations you give certainly don't support this claim. The reviewer is right. Increase in soil T would not necessarily cause increase in GPP. We have rewritten the sentence and have changed the citations in the revised version (Line 276-277).

4396, 9: "stimulated" rather than "simulated". The type error has been corrected (Line 303).

4396, 25: Most of the evidence has been produced in the last ten years, rather than "recent decades". We have replaced "recent decades" by "last ten years" in the revised version (Line 317).

4397, 11: You should give examples of models using the respective warming scenarios here, in order to substantiate this claim. We have added some examples of models using constant or diurnal warming scenarios in the revised version (Line 332).

4397, 26-29: You do not describe any sugar and starch content analysis in the methods or in the results. Either add these or leave out this line of evidence here. Thanks for the reviewer's suggestions. We have added a sentence in the methods to describe the method of measuring sugar and starch concentration in the revised version (Line 169-171).

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Fig. 1 and 6: Why are there no error bars in these figures? Thanks for the reviewer's comment. Here we used the warming effects in Figure 1 and 6. We first averaged data of all replicates from control or treatment plots, then calculated the treatment-induced absolute changes by $\text{Meantreatment} - \text{Meancontrol}$ and the treatment-induced relative change (%) by $100 \times (\text{Meantreatment} - \text{Meancontrol}) / \text{Meancontrol}$. Thus, there was no error bar in Figure 1 and 6. We have addressed it clearly in the revised version (Line 176-179).

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